



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



Geog. 139.3 Bod. Feb., 1889.



Harvard College Library

FROM THE BEQUEST OF

MRS. ANNE E. P. SEVER,

OF BOSTON,

WIDOW OF COL. JAMES WARREN SEVER,

(Class of 1817),

18 Jan., — 24 Dec., 1888.

PROCEEDINGS
OF THE
474-69
ROYAL GEOGRAPHICAL SOCIETY
AND
MONTHLY RECORD OF GEOGRAPHY.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

NEW MONTHLY SERIES.

VOL. X., 1888.

LONDON: EDWARD STANFORD,
26 & 27, COCKSPUR STREET, CHARING CROSS, S.W.
1888.

Geog. 139.3

LONDON:
PRINTED BY WILLIAM CLOWES AND SONS, LIMITED,
STAMFORD STREET AND CHARING CROSS.

Preservation Has Seen
excised maps 1-97

ROYAL GEOGRAPHICAL SOCIETY.

PATRON.

HER MAJESTY THE QUEEN.

VICE-PATRON.

HIS ROYAL HIGHNESS THE PRINCE OF WALES, K.G., K.T., K.P.,
G.C.B., &c., &c.

Honorary President.

HIS ROYAL HIGHNESS THE DUKE OF EDINBURGH, K.G., K.T.,
G.C.S.I., &c., &c.

COUNCIL

(ELECTED 28TH MAY, 1888).

President—General RICHARD STRACHEY, R.E., C.S.I., F.R.S.

Vice-Presidents.

Sir RUTHERFORD ALCOCK, K.C.B.

FRANCIS GALTON, Esq., F.R.S.

Sir JOSEPH HOOKER, K.C.S.I., C.B.,
F.R.S.

Major-General Sir H. C. RAWLINSON,
K.C.B.

General Sir C. P. BEAUCHAMP WALKER,
K.C.B.

Colonel H. YULE, R.E., C.B.

Treasurer—REGINALD T. COCKS, Esq.

Trustees—Right Hon. LORD ABERDARE, G.C.B., F.R.S.;
Sir JOHN LUBBOCK, Bart., F.R.S., M.P.

Secretaries—DOUGLAS W. FRESHFIELD, Esq.;
Colonel Sir FRANCIS W. DE WINTON, R.A., K.C.M.G.

Foreign Secretary—Lord ARTHUR RUSSELL.

Members of Council.

Sir HENRY BARKLY, G.C.M.G., K.C.B.

J. BALL, Esq., F.R.S.

Lord BRASSEY, K.C.B.

Admiral LINDESAY BRINE.

Hon. G. C. BRODRICK.

J. ANNAN BRYCE, Esq.

Major-General Sir F. J. GOLDSMID,
K.C.S.I., C.B.

Colonel J. A. GRANT, C.B., F.R.S.

Sir JOHN KIRK, G.C.M.G., F.R.S.

Lieut.-General Sir PETER S. LUMSDEN,
G.C.B.

COLIN MACKENZIE, Esq.

CLEMENTS R. MARKHAM, Esq., C.B.,
F.R.S.

ALFRED P. MAUDSLAY, Esq.

Admiral Sir F. L. MCCLINTOCK, F.R.S.

E. DELMAR MORGAN, Esq.

Sir RAWSON W. RAWSON, K.C.M.G.,
C.B.

B. LEIGH SMITH, Esq., M.A.

H. SEEBOHM, Esq., F.L.S.

Captain W. J. L. WHARTON, R.N.

General J. T. WALKER, C.B., F.R.S.

Colonel Sir CHAS. W. WILSON, R.E.,
K.C.M.G.

Assistant Secretary and Editor of Transactions—H. W. BATES, Esq., F.R.S., F.L.S.

Librarian—J. SCOTT KELTIE, Esq.

Map Curator—JOHN COLES, Esq., F.R.A.S.

Chief Clerk—S. J. EVIS, Esq.

Bankers—Messrs. COCKS, BIDDULPH, and Co., 43, Charing Cross.

CONDITIONS OF FELLOWSHIP, &c.

Candidates for admission into the Society must be proposed and seconded by Fellows, and it is necessary that the description and residence of such Candidates should be clearly stated on their Certificates.

It is provided by Chapter IV., § 1, of the Regulations, that,

“ Every Ordinary Fellow shall, on his election, be required to pay £3 as his admission fee, and £2 as his annual contribution for the year ending on the 31st December then next ensuing, or he may compound either at his entrance by one payment of £28, or at any subsequent period by the payment of £25, if his entrance fee be already paid.”

All Subscriptions are payable in advance, on the 1st of January in each year.

The privileges of a Fellow include admission (with one friend) to all Meetings of the Society, and the use of the Library and Map-room. Each Fellow is also entitled to receive a copy of the New Monthly Series of the Proceedings and the Supplementary Papers, the former of which is forwarded, free of expense, to addresses in the United Kingdom, and the latter obtained on application at the Society's office.

Copies of the Regulations and Candidates' Certificates may be had on application at the Society's Office, 1, Savile Row, London, W.

CONTENTS.

Authors are alone responsible for their respective statements.

No. 1. *January.*

	PAGE
Explorations in British North Borneo, 1883-87. By D. D. Daly, Assistant Resident in charge of Province Dent	1
Notes of a Journey from Domasi Mission Station, Mount Zomba, to Lake Namaramba, August 1887. By the Rev. A. Hetherwick, M.A.	25
Indian Marine Survey, 1886-87	32
Geographical Notes	33
Report of the Evening Meetings	41
Proceedings of Foreign Societies	45
New Geographical Publications and New Maps	46
MAPS.—British North Borneo; Lake Shirwa and Neighbourhood	60

No. 2. *February.*

An Exploration of the Rio Dôce and its Northern Tributaries (Brazil). By Wm. John Steains, F.R.G.S.	61
Notes on Demâvend. By General A. Houtum-Schindler, Persian Telegraph Service	85
Work of the Native Explorer M—H in Tibet and Nepal in 1885-86	89
Geographical Notes	91
Report of the Evening Meetings	100
Proceedings of Foreign Societies	100
New Geographical Publications and New Maps	105
MAPS.—Route from Mombasa to Mamboia	98
The Rio Dôce and its Tributaries	116

No. 3. *March.*

Siam. By J. M'Carthy, Superintendent of Surveys in Siam	117
Summary of Explorations in British North Borneo. By Admiral R. C. Mayne, C.B., M.P.	13
Lectures on Geography, delivered before the University of Cambridge, 1888. By General R. Strachey, R.E., F.R.S., President. Lecture I.	146
Note on the Map of Lycia-Pamphylia. By Professor W. M. Ramsay	160
Geographical Notes	164
Report of the Evening Meetings	169
Proceedings of Foreign Societies	169
New Geographical Publications and New Maps	175
MAP.—Siam	188

No. 4. *April.*

	PAGE
A Journey in the Interior of Labrador, July to October, 1887. By Randle F. Holme	189
Lectures on Geography, delivered before the University of Cambridge, 1888. By General R. Strachey, R.E., F.R.S., President. Lectures II. and III. ..	205
Geographical Notes	234
Report of the Evening Meetings	242
Obituary	242
Proceedings of Foreign Societies	246
New Geographical Publications and New Maps	250
MAP.—Labrador	260

No. 5. *May.*

On the Ruby Mines near Mogok, Burma. By Robert Gordon, C.E.	261
Lectures on Geography, delivered before the University of Cambridge, 1888. By General R. Strachey, R.E., F.R.S., President. Lecture IV.	275
Mr. F. C. Selous's Further Explorations in Matabele-Land	293
Geographical Education in Training Colleges and Elementary Schools	297
Geographical Notes	300
Correspondence	309
Report of the Evening Meetings	310
New Geographical Publications and New Maps	311
MAPS.—Ruby Mines District, Burma; Matabele and Mashona Land	324

No. 6. *June.*

Suanetia. By Douglas W. Freshfield, SEC. R.G.S.	325
Exploration of the Solomon Islands. By C. M. Woodford	351
Exploration of Route between Assam and Upper Burma	377
Geographical Notes	378
Obituary	385
Report of the Evening Meetings	388
Proceedings of Foreign Societies	388
New Geographical Publications and New Maps	394
MAPS AND ILLUSTRATIONS.—Ushba	340
Central Group of the Caucasus; A Spur of the Caucasus; The Solomon Islands	404

No. 7. *July.*

The Annual Address on the Progress of Geography: 1887–8. By General R. Strachey, R.E., F.R.S., President	405
The Island of Fernando do Noronha in 1887. By the Rev. T. S. Lea, M.A. ..	424
A Journey up the Cross River, West Africa. By H. H. Johnston, H.B.M. Consul	435

CONTENTS.

vii

	PAGE
The Kaap Gold-Fields of the Transvaal. By Fred. Jeppe, F.R.G.S.	438
Geographical Notes	447
Correspondence	455
The Anniversary Meeting	459
Proceedings of Foreign Societies	471
New Geographical Publications and New Maps	473
MAPS.—Cross River	436
Island of Fernando do Noronha; Kaap Gold-fields	484

No. 8. August.

A Journey across Central Asia, from Manchuria and Peking to Kashmir, over the Mustagh Pass. By Lieut. F. E. Younghusband, King's Dragoon Guards	485
Unexplored Basuto Land. By Lieut.-Colonel Sir Marshall Clarke, K.C.M.G., H.M. Commissioner for Basuto Land	519
On the Influence of Arab Traders in West Central Africa. By Lieut. H. Wissmann, Gold Medallist, R.G.S.	525
Geographical Education: The Year's Progress at Oxford	531
Geographical Notes	533
Report of the Evening Meetings	536
New Geographical Publications and New Maps	538
MAPS.—Central Asia; Basuto Land	548

No. 9. September.

Hudson's Bay and Hudson's Strait as a Navigable Channel. By Commodore A. H. Markham, R.N.	549
The Exploration and Survey of the Little Andamans. By Maurice Portman, Esq.	567
The Hydrography of South-Eastern Tibet. By Gen. J. T. Walker, C.B., &c.	577
On the Length of the Persian Farsakh. By General A. Houtum-Schindler, Persian Telegraph Service	584
Geographical Notes	588
Correspondence	594
Proceedings of Foreign Societies	595
New Geographical Publications and New Maps	603
MAPS.—The Country between Yarkand River and the Mustagh Range	548
Hudson's Bay; Andaman Islands; Hydrography of South-Eastern Tibet (4 Maps)	612

No. 10. October.

Account of Christmas Island, Indian Ocean. By Captain W. J. L. Wharton, R.N., F.R.S., Hydrographer to the Admiralty	618
On the New Lake between Kom and Teherán. By H.M. the Shah of Persia	624

	PAGE
The Bantu Borderland in Western Africa. By H. H. Johnston, H.M. Vice-Consul, Cameroons	633
The Earthquakes of May and June, 1887, in the Verney (Vernoe) District, Russian Turkestan, and their Consequences. Translated by Miss M. B. Hay, of Tashkent	638
Geographical Notes	646
Correspondence	652
Proceedings of the Geographical Section of the British Association, Bath Meeting	654
New Geographical Publications and New Maps	668
MAPS.—Lake of Savah and Neighbourhood; Cameroons District (Ethnological Map)	676

No. 11. *November.*

The Peaks, Passes, and Glaciers of the Caucasus. By Douglas W. Freshfield, SEC. R.G.S.	677
Meteorology of the Red Sea and Cape Guardafui. By General R. Strachey, R.E., F.R.S., PRES. R.G.S.	704
Geographical Notes	708
Obituary	713
Proceedings of the Geographical Section of the British Association, Bath Meeting	717
New Geographical Publications and New Maps	735
CHARTS.—Meteorological Charts of the Red Sea and Cape Guardafui	748

No. 12. *December.*

The Niger Delta. By H. H. Johnston, H.M. Vice-Consul for the Oil Rivers	749
The Key, or Ké, Islands. By Captain G. Langen	764
A Note on the Conservative Action of Glaciers. By Douglas W. Freshfield, SEC. R.G.S.	779
Geographical Notes	790
Report of the Evening Meetings	800
Proceedings of Foreign Societies	801
New Geographical Publications and New Maps	803
MAPS.—The Niger Delta; The Ké Islands	812
INDEX	813

VOL. X., No. 1.
New Monthly Series.]

JANUARY, 1888.

[To Non-Fellows,
PRICE 1s. 6d.]

PROCEEDINGS

OF THE

Royal Geographical Society

AND

Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE		PAGE
EXPLORATIONS IN BRITISH NORTH BORNEO, 1883-87. By D. D. DALY, Assistant Resident in charge of Province	1	INDIAN MARINE SURVEY, 1886-87	32
Dent	1	GEOGRAPHICAL NOTES	33
NOTES OF A JOURNEY FROM DOMASI MISSION STATION, MOUNT ZOMBA, TO LAKE NAMARAMBA, AUGUST 1887. By the Rev. A. HETHERWICK, M.A.	25	REPORT OF THE EVENING MEETINGS	41
		PROCEEDINGS OF FOREIGN SOCIETIES	45
		NEW GEOGRAPHICAL PUBLICATIONS	46
		NEW MAPS	55

MAPS.

BRITISH NORTH BORNEO	60
LAKE SHIRWA AND NEIGHBOURHOOD	60

13 LONDON: EDWARD STANFORD, 55, CHARING CROSS, S.W.

PARIS: ANDRÉAT-GOUJON.

VIENNA: ARTARIA & Co.

HAMBURG: L. FRIEDRICHSEN & Co.

ST. PETERSBURG: WATKINS & Co.

MANCHESTER: JOHN HEYWOOD.

EDINBURGH: DOUGLAS & FOULIS.

DUBLIN: HODGES, FOSTER & Co.

BERLIN: D. REIMER.

LEIPZIG: F. A. BROCKHAUS.

NEW YORK: SCHUBNER & WELFORD.

PHILADELPHIA: LIPPINCOTT & Co.

MELBOURNE: GEORGE ROBERTSON & Co., LIMITED.

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA.....	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO.....	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR.....	"
KURRACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

LIEBIG COMPANY'S EXTRACT OF MEAT

Justus Liebig

*** Ask for the COMPANY'S EXTRACT,
and see that it bears JUSTUS VON LIEBIG'S
SIGNATURE IN BLUE INK across the Label.

LUXURIANT GLOSSY HAIR

Is assured to those who discard poisonous hair restorers and dyes and cheap oils,
which produce eruptions on the scalp, and use

ROWLANDS' MACASSAR OIL,



Known for nearly 100 years as the best Preserver and Beautifier of the Hair.
It contains no lead or mineral ingredients, and can now also be had in a
GOLDEN COLOUR for fair-haired children.

Sizes, 3s. 6d., 7s., 10s. 6d. (Family bottles equal to 4 small).

Ask Chemists for ROWLANDS', and avoid cheap worthless imitations under similar names.

JAN 13 1883

PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY

AND MONTHLY RECORD OF GEOGRAPHY.

Explorations in British North Borneo, 1883-87.

By D. D. DALY, Assistant-Resident in charge of Province Dent.

(Read at the Evening Meeting, December 12th, 1887.)

Map, p. 60.

THE purport of this paper is to give a personal record of two exploring expeditions which I undertook, from the east and from the west coast of North Borneo to countries and tribes in the interior hitherto unvisited by the "white man."*

On 27th August, 1884, I left Sandakan, the capital of British North Borneo, in the steam launch *Sabine*, and entering the mouth of the Kinabatangan, ascended this, the largest navigable river of the territory,

* The harbours and coast-line of British North Borneo are carefully delineated in the Admiralty charts, and the 'Handbook of British North Borneo' affords abundant information regarding the climate, trade, products, minerals, agriculture and form of government that obtains in the youngest colony of Great Britain.

The most southerly point is in lat. $3^{\circ} 52' N.$; the most northerly, $7^{\circ} 25' N.$; the most westerly point is in long. $115^{\circ} 20' E.$; the most easterly, $119^{\circ} 16' E.$

The area is computed at 31,000 square miles.

The seaboard is estimated at 700 miles.

Population, 150,000.

Sandakan, Kudat, and Gaya are the principal land-locked harbours. Sandakan, which is 1000 miles distant from Singapore, is the headquarters of the Government.

Two hundred thousand acres have been taken up for tobacco planting.

A Royal Charter was granted on 1st November, 1881, and the following Treasury returns speak for the steady progress of British North Borneo.

TABLE OF COMPARATIVE REVENUE, EXPENDITURE, AND TRADE.

Year.	Revenue Proper.	Expenditure Proper.	Imports.	Exports.
	dollars.	dollars.	dollars.	dollars.
1881	20,208	108,295	160,658	145,444
1882	38,935	189,223	269,597	133,655
1883	50,738	267,531	423,919	159,127
1884	82,449	196,240	481,414	262,759
1885	110,256	208,072	648,318	401,641
1886	127,731	195,803	849,115	524,724

as far as the draught of the vessel permitted, and thence proceeded in boats. The banks were lined on either side with mangroves and nipa palms as far as the tidal influence, and the first place of importance reached was Malapi. This is the *dépôt* for the edible birds' nests that are brought from the marvellous Gomanton Caves, which are situated about 12 miles to the northward. The nests that are collected are valued at 25,000 dollars per annum, and the North Borneo Government had let the caves in 1884 at a yearly rental of 9000 dollars. The height of one of the vaults in these limestone caves has been estimated at 900 feet, upwards of twice the height of St. Paul's, London, and some idea may be formed of the swarms of swifts (*Callocalia*) when it is said that a steady column of these birds has been timed by watch to fly for three-quarters of an hour from one of the apertures. Scientists are agreed that the birds' nest is composed of the inspissated saliva of the bird. All these birds' nests are sent to China, where they are prized as a luxury in the well-known Chinese birds'-nest soup. It should be noticed that all the birds'-nest caves in the territory are formed of limestone rock, and that these are isolated mountains of limestone in a country of secondary formation.

I had five boats in tow of the steam-launch, and they were especially selected from being flat-bottomed dug-outs for facilitating transit over the rapids. After passing Bod Langit—which means the hill to the skies—a legend recording that it formerly reached the heavens, but owing to the wickedness of the inhabitants it subsided to its present height of 400 feet—large boulders of stratified sandstone dipping to the eastward at an angle of 35° were noticed in the banks. Then a hill of limestone called Chuko Besar, which contains some small caves and yields a few hundred birds' nests each year. The Kinabatangan here, at a distance of 85 miles from the mouth, is four fathoms in depth and about 50 yards wide, with high banks. Many places were now passed on either side which had been abandoned some eleven years previously on account of that terrible scourge of the East, small-pox. When natives are asked their age, the usual answer is that they were so many years old at the time of the last epidemic of small-pox. The interval between each has been named to me as eighteen or twenty years, and the old men sometimes acknowledge to have seen the ravages of three or four epidemics. Vaccination has of late years been largely availed of and sought after by those natives who have come under the influence of the North Borneo officers.

From Malapi to the mouth of the Lokan river there are rich tracts of low-lying lands, well adapted for sago plantations, sugar, and other low-lying products. In the banks I noticed from three to nine feet deep of loamy humus deposits in many places. The total absence of sago plantations, except a few sago-trees in gardens, on the east coast, has never been accounted for, and is still more surprising from the vast area

of wet, swampy lands in which the sago-palms love to grow spontaneously and throw out suckers. On the west coast the sago plantations form the principal industry of the people, and the export royalty on the same is the largest item of revenue. Last year, at the request of Governor Treacher, I forwarded 2000 roots of sago-palms from Province Dent on the west coast to Sandakan on the east coast, to form the nucleus of a sago plantation, and it was satisfactory to learn lately that the plants had struck, and we may hope to see the sago cultivation extend all over the east coast in future years.

The recapitulation of names of places would be tedious in this paper, and the accompanying map of North Borneo has been specially compiled for reference; the large rivers Kinabatangan and Padas are from my field notes.

The settlements between Malapi and the Lokan river are the most flourishing, and are inhabited by Sulus, Buludupis, and Tambanuahs on the river Kinabatangan. There are no villages such as are understood in other countries; the names comprise certain tracts of country, frequently a streamlet or an important bend of the river, and the houses are widely scattered, each house having its own padi-fields, fruit plantations, and a patch of jungle scrub land. At many places on either bank were to be seen dense clumps of fruit trees that were allowed to run wild when the small-pox decimated or drove the people away. These trees comprised langsat, durians, two kinds of rambutans, two kinds of pulasans, two kinds of the Chinese lichee, limes, oranges, and mangoes; many of them were richly laden with a profusion of fruit, which travellers were free to gather, and with which the boatmen loaded up my boats.

Large game in the jungle comprises elephants, rhinoceros, deer, and wild pig. Among birds we got some fair snipe and pigeon shooting. The argus pheasant is common, but is surpassed in beauty by the burnished sheen of the metallic-fire back and white-plumed tail of the "Bulwer" pheasant.

We found a settlement called Sebongan completely deserted on account of the voracity of the crocodiles; the flat-bottomed dug-outs in which the natives paddle about being easily capsized, and the occupants devoured by these crocodiles.

The river Lamag, on the true right, is used by light-draught boats, and from the head of it to the Segama river gold-fields the distance is 22 miles. A road is now in course of construction to enable the miners to reach the goldfields, and when it is completed, Sandakan, the capital, will, via Segaliud river, and overland to the mouth of the Lamag, be within two days' communication of the Segama gold-fields.

The highest point of navigation for steam launches drawing six feet is the Lokan river, an important tributary that takes its rise in a spur of the mountain Kinabalu, 13,680 feet high. There is a considerable

population on the Lokan river, and the people are friendly. I now followed up the Kinabatangan in boats; a strong current against us limiting the speed to $1\frac{1}{2}$ mile an hour.

Sapatidak, Belat, Belongan settlements, were now passed, and there were small patches of crops of swamp rice, Indian corn, sugar-cane, native tobacco, ground-nuts, betel-nut palms, coco-nut trees, sirreh-leaf vines, and the usual tropical garden vegetables.

On the true right the River Maluar, said to be auriferous, was passed, but heavy rains had swollen its current so that it was impossible for the boats to stem it.

The scattered huts of Dalimarcot now came in view, and the small clearings were a relief to the eye after having passed through a large extent of uninhabited jungle forest. Here in both banks were compressed heaps of leaves and wooden *débris* from four to ten feet thick, that had been washed down by floods. Where the river water had washed part of the layers away, the section of the bank presented the appearance of a cutting in a haystack. These large deposits, if undisturbed, may, after many centuries of compression, form into coal. The banks in many places are 40 feet high, and numerous fruit trees denote former habitations.

The river Quarmote, on the true right bank, was now reached, and the chief, Rajah Tuah Dorkas, was interviewed. There were forty-four houses on the north bank of the Kinabatangan, and all the people, excepting traders, belong to the Tambanuah tribe. They wear only the loin-cloth (*chawat*) and carry blow-pipes (*sumpilans*) and poisoned arrows.

Rajah Tuah Dorkas is a Tambanuah converted to Mahommedanism; he and Panglima Sarei receive the proceeds of the Batu Timbang Caves in alternate years. These caves are situated on the river Quarmote, and are difficult of access on account of rapids; small boats can be paddled in ten days up to the foot of the limestone mountain. The birds' nests given to me were of the best white description, but the large proportion are grey, mixed with feathers. There are two seasons per annum for collecting them. Experts say that if there were three collecting seasons per annum, all the bird's nests would be white and of the highest value. As at present managed, the nests are allowed to grow too old, are mixed with feathers, and young swifts are hatched therein and many of these valuable nests are spoiled. If the nests could be gathered before the eggs are laid, three harvests per annum could be collected with much profit.

Government supervision would, as in the Gomanton, Madai, Segalong, and other caves much conduce to a larger output from the Batu Timbang caves; but the journey is arduous, and could not be accomplished there and back under three weeks from the Kinabatangan river.

I made an agreement with the chief that in consideration of police and other Government protection, one-third of the birds' nests should be

given to the Government per annum. The products from the Quarmote river are, rattans, guttapercha, birds' nests, camphor, and beeswax.

In the evening the people were called in by sound of gong to have a dance (*main-main*) in my honour. They came in large numbers, and dancing was kept up till daylight. The favourite dance consisted of the women holding each other's hands, moving in one circle, whilst the men also holding hands, moved in an outside circle but in the opposite direction. The band was composed of gongs tuned to different keys, and wooden drums; the music, it is needless to say, was monotonous to the European ear.

At a place called Tagai, we came upon a wild tribe of Tungaras, who all jumped ashore and ran away from us, leaving five long boats in the river. We put some rice and fruit in their boats to show them that we were friendly; and the next place was Baka, where there were some more clearings belonging to the Tambanuah tribe. Here we came upon a rapid where the force of the current was very great. The stratified sandstone rocks now dip to the westward at an angle of 20° , whilst the same rocks on the lower part of the Kinabatangan were always observed as dipping to the eastward. Our boats are now dragged by rattans that are pulled by our boatmen as they walk along the bank.

At the Karamuk river we found the chief, Deramatuan, an intelligent and very friendly Tambanuah, who has much influence among the Sukongs and other tribes about the Karamuk river. But there are old standing blood-feuds with the Puteh tribe on the Labok river, and head-taking is a recognised custom; and Deramatuan, who is well aware that Government is determined to put an end to this baneful practice, is unable to stop it. This river is said to take its source from the same high range that feeds the Labok and Kinabatangan rivers, and which is called by these people Mangalaskalas, but known as Bod Udan by the tribes of the interior. Paddling up to the mouth of the river Karamuk, the silence of the great river was suddenly broken by plaintive strains of song which re-echoed among the rocks and hollows of the Kinabatangan. On a high bank beneath clumps of fruit-trees, there were twenty Tambanuah men and women performing an incantation over some medicine which was to be administered to the chief, Deramatuan. They all held palm branches in their hands, which they waved in graceful unison and in perfect time to the melodious cadence of their voices. The women sang one line, and the men took up the solemn refrain in a sort of Gregorian chant. They danced gracefully, holding each other's hands, in a ring around the mysterious object of their charms; both the dancing and singing are continued until the sorcerer declares that the spell has been worked over the medicine. It should be stated that the Tambanuahs declare that after death, their souls find rest in peace on the top of the great mountain Kinabalu, as their forefathers believed before them.

At Imbok, where Pangeran Besar Asin is the ruling chief, a curious mausoleum was visited on the bank of the river. It is built of solid bilian wood, the posts and beams are prettily ornamented and fluted, the ends being carved into grotesque heads of animals. These bilian posts are perfectly sound, although I was assured that they must have been over a hundred years in the ground, and are proof against the inroads of the white ants. There are thirty or forty bodies in one mausoleum, which is encircled with fruit-trees, the clusters of langsat and rambutan overhanging in graceful profusion. At Punpun the headman is Rendom, who lives in a large house raised ten feet off the ground; there is a centre passage through the top part, with many rooms containing families on either side, the people being very shy. Underneath there are the usual pigs and some hunting dogs. We now frequently meet boats, paddled about by two Tambanuahs, each boat containing from five to seven hunting dogs, which are landed on the bank at various places, and invariably find either deer or wild pig; the natives know by the bark of the dogs when the quarry is at bay, and it is then despatched with spears. There are high mountains, called Bod Narkiw, visible from Imbok, to which I got some compass bearings. These ranges are said to contain birds' nests, but I was unsuccessful in finding any one who had visited them.

The Tambanuah, Romanow, and Tungara tribes are afraid to enter the caves, they assert, on account of tigers and dragons which inhabit them.

All along the banks we found rich soil, the secondary sandstone formation still prevailing. At Karangan the tribe of Romanows were first met—Headman, Tamat. There are about 500 Romanows scattered about this district; they are very wild, and live in wretched hovels. They plant padi, move from place to place on the rivers every second year, making a fresh clearing each time, and therefore destroying much valuable jungle forest. Their habits are gregarious, and they will not settle down and make permanent homes. At Kwáyoh we saw large clearings, planted with padi, ground-nuts, Indian corn, and sugar-cane. We ascended the hill about 300 feet high, and obtained good magnetic bearings to Kinabalu, which will approximately determine our longitude.

On September 15th, 1884, we reached Penungah, where we found five Dayak constables; it was a great relief to leave the boats after twenty days' voyaging from Sandakan. During the last ten days the work of getting through the rapids was very trying to the boatmen, who sometimes drove the boats with poles, sometimes dragged them by ropes along the bank, and sometimes all hands lifted the dug-outs over the rocks and through the tumbling waters. At the rapid Tapugnet the confused waters broke in waves over the boats, and it required fifteen men to drag my boat through.

The police station at Penungah is situated at the junction of the Penungah river with the Kinabatangan river; and though it is elevated

70 feet above the present level of the river, which is 450 feet above sea-level, the floods during the rainy season, November and December, have been known to rise in these gorges and lap the foundations of the police-station. There we found, and also at various places during the journey up the Kinabatangan, large bamboo rafts, called lanteens, made fast to the bank by rattans. On the raft there is a house constructed of bamboos and leaf-walls and roof, which protects the trader, his family, and the goods he has for sale. The goods consist of Manchester shirts, bags of rice, kerosene oil, brass-ware, dried fish and salt, the latter commodity being very expensive. In return, the natives bring from the interior, guttapercha, indiarubber, camphor, birds' nests, beeswax, and other jungle products. The use of money is unknown, all transactions are by barter, and commerce between different tribes and races may be viewed here in its most primitive state.

Penungah will in future years be an important depôt for trade with the interior from the east coast, from its situation near the confluence of several rivers. At present there are only a few houses where jungle produce is stored to await the arrival of the lanteens from the sea-coast. Four years previously it would have been dangerous for any of the inland tribes to visit Penungah; now, with the presence of a few constables, the Tungara, Romanow, Tambanuah, and other tribes pass and repass opposite the police-station with perfect freedom and security. The Sarawak Dyaks are quite fearless in penetrating to the interior mountains, and bring to Penungah large quantities of guttapercha, indiarubber, beeswax, camphor, and edible birds' nests. My men now required a spell, five of them were down with fever, and in spite of every care and doses of quinine one of them died. During the nineteen days that we were coming up the river there were heavy fogs hanging about all night until 8 or 9 A.M., when the sun came out with tropical intensity and dried our wet clothes; the sudden transition from drizzling cold to steaming heat often brought on feverish attacks.

About a mile higher up than Penungah, the Kinabatangan branches into two rivers, viz. the Melian and the Mungcago. The Melian is the proper Kinabatangan, but the latter name is dropped. All around them are high ranges varying from 2000 feet to 6000 feet, and densely covered with jungle. The pebbles in the streams contained granite, sandstone, silicates, quartz, micaceous schist, and large quantities of iron pyrites embedded in blue claystones and rolled pieces of coal. The prevailing rock is sandstone; the granite has evidently been washed down from the slopes of Kinabalu. Near the Mungcago river we were taken to a mineral spring, the water tasted salt, probably one of the salt oxides of iron, and all around were tracks of wild cattle and of deer, that came to lick the salt. The people drink the water as medicine for rheumatism. The head-hunting tribes on the Mungcago river are still carrying on their blood-feuds.

On September 24th, 1884, I ascended the river Melikop in flat-bottomed dug-outs, and after three days' pulling and poling through rapids, reached the Obang-Obang limestone birds'-nest caves, which had hitherto not been visited by Europeans.

It is three hours' climb from the Melikop river to the caves; the aneroid registered 1810 feet above sea-level at the entrance of the caves. The last half-hour's walk was over slippery mossgrown limestone boulders, and the air was strongly impregnated with the odour of the bats' and swifts' deposits of guano. The first cave reached is the most valuable, but can only be entered by experts in climbing. The entrance is a small hole about 4 feet by 4 feet, and is closed by a wooden grating so as to attract attention to the spot, as otherwise the unwary traveller might suddenly be precipitated to the depths below. Every two months this doorway is opened, and the climbers let themselves down into the caves by means of rattans, and gather all nests, either large or small. This makes six seasons per annum, and the same periods are also observed in the collections at the Senobang caves in the Ulu Penunah. The seasons at Gomanton, Batu Timbang, Madai, and Segalong number two or three during the twelve months, and these are too few according to the Tungara tribe. They maintain that by collecting frequently, say six times per annum, they procure white nests in first-rate order, though some of their nests are young and but half formed, and that the Sulu traders give them a higher price in consequence. I noticed a great scarcity in swifts, and a great preponderance of bats, which might be attributed to the too frequent collection of nests, which prevents the swifts from breeding.

The Obang-Obang mountain runs north and south, and is half a mile in length. There are seven entrances to the vaults from the top of the range, all situated close to each other. Five of these vaults do not contain any birds' nests, there being no swifts, only bats dwelling there. The only chamber that can be entered by any one who is not an adept at climbing on rattans to the roof of the vaults is only 50 feet high, and contains both bats' and swifts' nests. The bats' nests are similar in form to the swifts', but are made of moss only, which these mammalia pick off the limestone boulders outside. There were some handsome stalactites that were uninjured, and some stalagmites were forming on the floor of the chamber. We climbed up to the summit of the mountain, aneroid registering 2150 feet altitude above sea-level, and obtained a grand panoramic view of Kinabalu (altitude 13,698 feet) and other high ranges. Among the trees were casuarinas, hill bamboos, cedars, rattans in great profusion, and the wild betel-nut, which my followers were glad to chew, as they had run out of the cultivated kind. The two nights that we slept there were very cold, and we saw nothing of the dragons and other preternatural animals that Tungara legends recorded as haunting these hills. On our way down the hill we

had a few rifle shots at orang-utan (*mias*) in some lofty trees; they abound in these parts, and their red-haired skins are worn by Tungaras as martial cloaks on the war-path. On my return to the village of Gamud, I made arrangements with the Tungara chiefs that they should pay the North Borneo Government one-third of the birds' nests that were collected each season as their tribute for protection of life and property afforded by the establishment of a police-station at Penungah. To this proposal they willingly agreed. When I first arrived here the women and children ran away and hid themselves in the back rooms of the house, and the men looked nervously suspicious; none of them had seen a white man before, and they examined my arms and chest, and were very merry at the idea of my skin being white, which they seemed to think an absurd freak of nature. We soon established friendly relations, and they brought in quantities of fruit, fowls, and Indian corn, which made a large heap at my feet. I returned them presents of blue drill, brass wire, Chinese tobacco, salt, and beads. They all smoke from morning till night, and out of pipes that have brass mouth-pieces and large bowls, such as are also used by the Dusun tribes of the west coast. The tobacco is grown by themselves, and retains a green colour by their process of fermentation.

One of the first requests they made was to ask my permission to attack the Makecaliga tribe. This name is given to the inland tribes by the people of the east coast, but the same people are known as Peluans by the natives of the west coast. They urged that I might, in two days' march, reach the Sapulut tribe, who killed Mr. Frank Wittl and his thirteen followers in 1882. I explained that my mission was one of peace, and that I only sought information about the country, its products, and its inhabitants. In the clearings I found tobacco of the small-leaf variety growing very strong, though uncared for; also sugar-cane, Indian-corn plants standing nine feet high, sweet potatoes of several varieties, cotton trees, caladiæ, all looking very healthy, and denoting fertile soil. The padi is dibbled in the fields without the ground having been dug.

The Tungaras are a strong and well set-up race, taller than the coast tribes, fond of hunting with dogs and spears. They have not yet learned the use of guns or of gunpowder. They had not previously seen a double-barrelled breech-loader, and when I opened mine to put in a cartridge, they exclaimed, "Oh, it is broken!" I brought down a few of the swifts that build the edible birds' nests, and found them to be very small, and to have a patch of white on the back and tail.

The men only wear the loin-cloth; the women have but one garment, viz. a short petticoat, which is kept up around the waist by coils of brass wire; the young girls have, as an addition, coils of brass wire from the ankle half-way up to the knee.

The cloth is woven from the thread made from the cotton trees, "kapok," that grow luxuriantly around their houses, and the women

use the same kind of spindle for making thread as are common among the Dusuns of the west coast, holding the cotton in the left hand and occasionally giving a twist to the spindle with the right hand. The people knew of no other minerals besides coal and iron pyrites. Their houses accommodate from ten to fifteen persons, and they do not keep pigs under their houses as other sea-coast tribes are in the habit of doing. Their sleeping hours are peculiar. No bedding is used, but they sleep on mats until about midnight, when they wake up shivering with the cold of these inland mountains. A fire is then lighted on a large oval-shaped hearth, that is made of clay in the centre of each house, and all the inmates, young and old, sit round the fire until dawn in a crouching attitude, telling long-winded stories, sometimes nodding, and sometimes leaning against his or her neighbour with head resting on the knees. Their chants at night-time are doleful and monotonous in tone. For striking a light, the men carry in their waistbelt a small bamboo prettily carved, in which some tinder and a bit of porcelain are kept out of the rain. By holding the tinder and the piece of broken plate in the right hand, and striking it sharp on the side of the bamboo, the tinder is ignited.

Two attempts were made to visit the Senobang birds'-nest caves on the Penungah river, but the floods had now set in and the rapids were impracticable. The Tungaras at the head of the Penungah are hostile, and have a feud with the Tungaras and Tambanuahs who are friendly to the Government. I lost two boats that split on a rock in a rapid, and a rifle, two bags of rice, ammunition, lamp, my cooking utensils, and sundries were carried away by the rushing waters over the falls. The rainy season—October, November, and December—having set in, I returned to the sea-coast which I reached after an absence of sixty-four days.

My next exploring expedition will describe the Padas river and its tributaries on the west coast.

The embouchure of the Padas river is a vast delta emptying itself on the west coast opposite the British colony of Labuan; and the Padas river is the principal water-system of Province Dent, the latest and the most valuable acquisition, so named after Mr. Alfred Dent, the originator of the British North Borneo Company. The portion nearest to the sea-coast for 15 miles is covered with mangroves and intersected by numerous salt-water channels.

The next 50 miles of the Padas river pass through vast swamps of sago-palm plantations and padi-fields, with occasional belts of jungle forest. The people in these lowlands are mostly of the Besayah tribe, intermixed with Brunei, Malays, and Dusuns. The principal settlements passed were Gadong, Lupak, Limbawang, Berkalow, and Morak, where the sago cultivators are most numerous. Herds of buffalo and cattle roam along the banks; and the plains, where the padi-fields have been

allowed to run fallow, threw up luxuriant grasses. The houses and gardens denote a prosperous state of existence; the latter containing all the usual fruits and vegetables that are common to Singapore. A steam-launch drawing six feet ascends as far as Berkalow, a distance of 60 miles, when the base of the coast range is reached and sandstone boulders with iron bands dipping at an angle of 60° towards south-west, the strike being nearly north and south, indicate the recent rock formation. Nearly all the country between the coast range and the sea is one vast low-lying swampy stretch, where the sago-palms grow luxuriantly. When a palm tree has reached maturity, say eight or ten years old, it is cut down, split open lengthways with an axe, and the pith is chopped out with bamboo scoops, and by repeated washings the starch is sieved and extracted, and after drying in the sun, becomes the sago of commerce, ready to be shipped off to Europe. As fast as the sago-palms are cut down, fresh suckers spring up spontaneously, so that the sago plantations can never die out, and the export royalty on the same will remain a constant source of income to the Government.

On the true right passed the Mantannior Besar, a stream navigable for two days by small boats. This country is reported to be gold-bearing, but no specimens have as yet been brought in. I washed a good many dishes of dirt-gravel about here, but did not get the trace of either gold or tin.

After much poling and dragging of our boats through rapids and over rocky shoals, the landing-place Bebung was reached, the aneroid recording 140 feet above sea-level. Here the boats were hauled up on the bank, as further navigation is impracticable on account of rocky barriers, and the traffic is carried on by climbing over the coast range until the Padas river is again reached.

After two hours' climbing over rocks a fast-flowing river, the Sungai Rayoh, was reached, where traders make a dépôt for rattans, india-rubber, guttapercha, and beeswax, which has been collected and brought here for barter by Muruts, the generic name of the tribes residing on the Pagalan river and Upper Padas. After wading through the river Rayoh, we commenced climbing the dividing coast range, following a jungle track that trended over broken spurs of rocky hills. The line of moss-covered trees so essential in the eyes of Ceylon and other highland planters was reached at 2140 feet. The climbing now became more arduous, the more so as it was raining hard, and we were glad to reach the summit of the gap, where the aneroid registered 3200 feet. This pass is called "Tataubun," and the party had a rest, which gave time to the straggling baggage-carriers to climb up with their loads. All the summits of these ranges are very narrow, and precipitous on either side; and looking at the ranges from the sea-coast, numerous landslips are visible on the west coast. These landslips are in a great measure caused by the south-west monsoons beating with

relentless persistency on the sandstone formations. On this summit there is a rock christened "Penobon," about three feet from the track, and all travellers as they pass by are expected to place a bunch of leaves or a branch on the top of the stone. There was a heap of branches, ferns, and leaves, about two feet high, deposited by passers-by as their simple offering of propitiation to the spirit who guards the great mountain pass. It was pouring rain, the storm-clouds were carried across us by a strong breeze, and the view of the sea was totally obscured. These altitudes must be very damp, as all the trees are thickly encrusted with moss.

We now descended, and at 2310 feet reached a permanent rivulet called Sumpongho, where there were two small sheds or rest-houses for wayfarers. The rocks were sandstone impregnated with oxides of iron, quartz was also found containing crystals. In the afternoon we descended into the fertile and picturesque valley of the Pagalan river, the largest tributary of the Padas river. The Pagalan takes its rise in the spurs of the mountain Kinabalu. We crossed large plains of "lalang," i.e. a coarse sedge-grass that springs up after the ground has been exhausted by repeated crops of padi; but the soil was greasy and most productive, and evidently only required rest. Naloyan, near the Pagalan river, altitude by aneroid 610 feet, was the first village we reached, and the Murut chief Zalimboh put his house at our disposal. This is a large habitation, 50 feet square, very clean, no pigs underneath, though there are pigs under the neighbouring houses. There were fifty-two human heads and pieces of human bones hanging from the rafters of the ceiling; the skin of some of the faces was so well preserved by the process of tanning pickle that the expression could still be recognised. I explained that I could not eat my evening meal in a room where these were suspended, and asked Zalimboh to cut them down. This request he and his sons cheerfully complied with, but with a bland smile of patronising pity at the white man's amiable squeamishness, and so to humour me they took down the ghastly trophies, and huddling them altogether in rattan baskets, put them away at the back of the house; doubtless they were reinstated as drawing-room ornaments after my departure.

Our climb over the range 3200 feet high in the gap from the river Rayoh and down to the Pagalan river took ten hours, and the next day the party woke up very stiff. The news of a white man's arrival soon spread about among the populous settlements of the Pagalan and Padas rivers, and the Muruts began to crowd into the audience-chamber in such numbers that the air was redolent of the unpleasant odour of half-naked savages. Each chief brought a fowl or a few pounds of rice or a basket of Indian corn as a token of friendship, which I reciprocated with presents of red and blue drill-cloth, beads, and brass wire. Some brought in sugar-canes 10 feet long and of great thickness, bundles of bananas,

eggs, fruit, and vegetables, for which they received an equivalent in return. These presents were frequently offered by them with an ulterior motive, to gain my goodwill in some long-standing inter-tribal feud, and as I had come with the avowed object of stopping their head-hunting forays, I always returned a *quid pro quo* for their presents. The salt brought by us from the coast was a most valued commodity, as there was none in their mountain ranges, but medicines such as quinine, vaseline, medical oils, Cockle's pills, and plasters, proved to be wonderful talismans in gaining the goodwill of the Muruts. They are savages *pur et simple*, and came in their war-paint. The orderly stood at the foot of the stairs, and all spears, swords, blow-pipes, and poisoned arrows were taken by him, deposited in a heap under the house, and returned to the owners when they took their departure.

The Murut does not wear any clothes, but sports a bit of bark in front; some strings of coloured beads encircle his head, a few charms hang around his neck; he carries a spear as though he feared no man, and annexes a new wife whenever he is "off with the old love." The women and children are much neglected, and much of my time was taken up in giving medicines and dressing sores and wounds. The Muruts have from time immemorial borne a bad name as head-hunters, but those tribes near the coast under the influence of British officers are steadily abandoning their bloodthirsty raids. Of course those inland tribes that have not come within the pale of Government protection still keep up the debit and credit account of the number of heads taken by each tribe. The baneful custom of cutting off human heads by stealth and in open warfare is gradually dying out, but there are powerful tribes, numbering 1000 armed men in one locality, that are yet unreclaimed. The past history of Borneo, as well as of many other countries, teaches us that the more hostile and savage the tribe may be in its primitive state of ignorance, the more faithful and friendly it will become when converted by British influence from the errors of its ways. The experience of six years' settlement of British North Borneo has shown that not only have barbarous customs been abandoned by many of the native tribes, but that vast tracts of country have been made available for trade, where the indigenous products were previously locked up.

The Pagalan river is a shallow, turbid, and sluggish stream when not in flood, is 50 yards wide, and navigable by flat-bottomed boats for seven or eight days. There are rich patches of padi growing on either side, and rice is of a red colour. The pebbles in the river-bed were quartzose, bluestones, sandstones, and a few scattered pieces of granite, probably washed down from the Kinabalu ranges.

From Naloyan to Binahi the way led through many swamps and cultivated settlements near the Pagalan river. At Bahab, the path lay through plains of sedge-grass, and some of the houses were 100 feet

long by 50 feet wide. After passing Gunting and Punshilan, we arrived at the large house of Panglima Prang, all very clean, no pigs under the house, the inmates busy making mats and baskets from the leaves of the pandanus. Here I got the dried skin of a small leopard and of a bear of unusual size. The inmates were all armed with spears and blow-pipes; in their belts were sheaths of poisoned arrows. More rice-fields, Indian-corn and tobacco gardens, and we reached Binahi, which is situated at the junction of the Pagalan with the Padas river. All this part of the country is known as Sandéwar. The level of the Padas river at Binahi is 610 feet above sea-level by the aneroid. The chief of the Muruts is Maharajah Oban, and my party of followers all put up in his large house. In the evening I held a long conference with him and some of the neighbouring chiefs. Among others present were Maharajah Wali, Panglima Prang, Singha Muntri (i.e. the Lion Minister), and Singha Turbang (i.e. the Flying Lion). Their enemies from time immemorial are the Peluans, a generic name given to all aborigines in the interior and corrupted into Punan by the coast people. It was with a view to putting a stop to the head-hunting raids between the Muruts and Peluans that I came here. The Muruts were very frank in naming and numbering the heads they had taken; and I found the debit and credit account to be as follows:—The Muruts have taken twenty-six heads of Peluans, the Peluans have taken thirty-one heads of Muruts; balance in favour of Peluans five heads, and four Muruts who were also wounded in the last affray. Each side distrusts the other, and peace can only be made by the Peluans paying a commensurate amount of blood-money in compensation for five heads that stand against them. I accordingly sent word to the Peluan chiefs that I would be on the Upper Padas in six days, requested them to meet me, and guaranteed their safety from the Muruts. During the interval I explored part of the Pagalan valley, and then turned down the Padas river to visit the gorge named "Batu Penutol," a remarkable gap in the coast range, through which the Padas river has burst. This gorge is situated about $1\frac{1}{2}$ miles from the junction of the Pagalan river; it is 18 yards wide, with nearly perpendicular ferruginous sandstone rocks on each side; above these rocks are stiff slopes for about 400 feet, which culminate in the jungle-clad ranges up to 5,000 feet on either side. In the rocks of the gorge there are holes and fissures in which bees swarm, and the Muruts are watchful to take away the wax and honey before the floods come down. On the right there is a cavern in the rocks, and the popular belief is that this is the home of a dragon that keeps guard at the great gate of the Padas river.

We paddled through the gorge, but could only descend the river for half a mile, as all navigation was found to be impracticable on account of rocky rapids. We could find no traces of gold or other minerals,

although we washed many dishes of gravel-dirt in different parts. The rocks here are all sandstone, weathered black from the combined action of the air and water; these have also laminated bands of iron in places coated with quartz crystals.

There is a peculiar feature about the floods that come down the Upper Padas and Pagalan rivers in consequence of the narrowness of the gorge. When the floods reach this junction, there is hardly any current perceptible in the rising waters, which are blocked up against the mountain range, and form a reservoir covering many square miles. The country appears like a large lake, some three miles wide. The waters rise steadily, but there is no swift rush of waters to make it dangerous. When the flood rises above the flooring of the house, and makes the latter untenable, the inmates betake themselves, with their goods and chattels, to higher ground, where they remain until the flood has subsided. Sometimes the houses stand, and only the roofs are carried away. If a house is found to be floating away, ropes of rattans are made fast to it, and boats tow it to a safe place. I fixed on a spot for a police-station and a market-place in Sandéwar, so that trading with the interior may be carried on with mutual security between the coast people and the aborigines of the interior. The Muruts promised to give the police every assistance. The land is a rich brown detritus, and up the hill-sides of Tonam and the ranges—800 feet above the river-level—may be seen patches of hill padi, sweet potatoes, and Indian corn. The women work at clearing jungle and planting as well as the men. Provisions are very cheap, but the Muruts are improvident, and seldom store sufficient rice for their yearly consumption. Money is not understood. Murut boys drilled holes in the North Borneo copper cents which I gave them, and wore them as necklaces and in their waistbands. All trading is carried on by barter. For four yards of blue drill-cloth, worth 15*d.*, I received 20 lbs. of red rice, which would have cost 3*s.* 2*d.* at Mempakol; also ten fresh eggs for blue drill worth 2½*d.*; 100 cobs Indian corn for red Turkey drill worth 7*d.*; fowls from 2½*d.* to 5*d.* each.

The people have nearly all they want in the way of food, excepting salt. These large rivers yield them fresh-water fish every day. The forests are full of deer, which multiply, as there are no tigers, as in India and in Malay Peninsula, to kill them, and some one of the large household brings in a deer or two every few days to one house. The flesh is dried and smoked, and carried about in baskets as provisions on a journey. They grow their own tobacco, which is dried green, and is smoked by both men and women in huge cigarettes, the covering of which is made of banana leaves. On the sea-coast the cigarette wrappers are made from the young shoots of the Nipa palm. All the tropical fruits are plentiful during the season, and when the rice harvest has been gathered in, the Muruts brew a strong spirit called "burack" from fermented rice which is not boiled. This is the same spirit which intoxicates the Dusuns of

the west coast, but there is this difference between the Muruts and Dusuns: the Murut drunken revelry is confined to the men only; but with the Dusuns I have seen men, women, and children all rolling about, shouting and laughing in their mad orgies.

Many chiefs from Ilagood, Towán, and other parts of the Pagalan river came to see me at Binahi, and they frequently expressed a hope that a European officer would be sent to live among them, so as to put an end to their blood-feuds. They spoke very candidly and cheerfully, through the interpreter, who translated the Murut dialect into Malay to me, telling their grievances, and recounting, with a certain sense of pride in their prowess and valour, the number of heads they had taken in their lives, and the names of their Peluan victims. I explained that the past was passed, and that the British North Borneo Government would not take cognisance of what had taken place when there was no form of government over them, but that in future head-hunting would be treated as murder, and the offenders hanged. They promised to pay annual capitation-tax to government, viz. one dollar for married men and half a dollar for bachelors per annum.

As these wild tribes did not understand either silver or copper coinage, they agreed to pay in kind at the following rates:—150 rattans, valuing the rattans at 1 dollar per 100; or 4 catties (= 5½ lbs. avoirdupois) of guttapercha, valuing the guttapercha at 30 cents a cattie; or 5 catties beeswax, valuing the beeswax at 25 cents a cattie; or 6 gantongs (= 18 lbs. avoirdupois) rice, valuing the rice at 18 cents a gantong. These rates of poll-tax were for married Muruts; one-half of these to be paid by bachelors.

The climate in these valleys that are surrounded by high ranges is very pleasant; very few mosquitoes, no sand-flies, and cool nights.

Two Muruts started off for the sea-coast with a letter from me, and returned after three hours' absence, looking very serious. They said they had walked for upwards of an hour when a deer ran across a padi-field in front of them, and as this was a bad omen when starting on a journey, they returned. The superstitious fears common to savages prevail amongst all these tribes. A bird flying in an untoward direction, a fowl with its head chopped off flapping on the ground towards a certain point, blood shed by some simple accident on a journey, the cry of birds, such as argus pheasants, hawks, or wood-pigeons—all these are omens, good or bad, according to fixed laws handed down by tradition, presaging failure or success either in peaceful journeys or on the war-path.

During many years spent amongst wild tribes, I have found medicines of all sorts, as other travellers in other countries have also experienced, to gain the goodwill of savages. In this country of Sandëwar, Province Dent, the principal complaints were sores, fever, dysentery, and other interior complaints. For sores and wounds,

vaseline and carbolic oil were found to be most beneficial and in great demand; lead and opium pills were efficacious in cases of dysentery. For these remedies I was indebted to Dr. J. H. Walker, Principal Medical Officer of British North Borneo, whose published reports after many years' service in the country testify to the salubrity of the climate.

The crocodiles are very numerous in these fresh-water rivers, and many of the natives are taken by them every year. A large crocodile, 14 feet long, was towed by boat to the bank close to the house of the chief Maharajah Oban, where I was staying. It was shot by a Peluan. There was much joy manifested by the Muruts at its capture, as it had eaten a brother-in-law of the chief. Pieces of the bones and skull were found inside, and brought to the house with a good deal of merriment. A chief who has many wives has usually many brothers-in-law, and he is obliged in a measure to assist or support the latter. The loss, therefore, of a brother-in-law more or less is not only immaterial, but rather a merciful dispensation; and so there was as much joy, feasting, and congratulation as if Maharajah Oban had been presented by one of his wives with a new baby.

Whilst waiting for my messengers to return, who had been sent to summon the chiefs of the Upper Padas to meet me, I visited many of the outlying settlements, making surveys by prismatic compass, and estimated rate of travelling by watch, and the natives everywhere welcomed the "white man." In many of the houses I expressed satisfaction that there were no human heads hanging in the head-chamber; and I was informed that the people had cut them down, as they had heard that I would not enter or take a meal in a house where they were to be seen.

The Upper Padas river near its junction with the Pagalan river is 70 yards wide, with a strong current. Having met some Sarawak Dyaks, who were looking for guttapercha and camphor, I bought their boat, and accompanied by fifty followers ascended the Upper Padas. The party was composed of one Punjabi sergeant, three Dyak constables, and the rest were Muruts, Besayahs, Brunei Malays, and traders. For the first few miles there were small plots of rice, sweet potatoes, and Indian corn on each side, and then cultivation ceases and tangled masses of rattans line the banks. Many trees are seen with branches bowed down with the weight of bees' nests and large cakes of yellow beeswax. The absence of cultivation near the margins of large rivers is a common feature in North Borneo; the fact is, the people prefer making settlements at the head of small streamlets, where heavy floods cannot reach them.

The first night we camped on a large deposit of rolled stones in the river; and I shot a "kijang," a small spotted deer, quite a feast for the party. The night was cold and foggy, and the mosquitoes very busy.

No. I.—JAN. 1888.]

c

A herd of wild cattle (Malay *tumbadow*, scientific name *Bos Gaurus*) had trodden down a cane-brake. These cattle are large, of a brown colour, with yellow legs, pretty heads, and handsome horns. They are sometimes speared, but the natives do not as a rule like to approach them.

The next day we found some trees black with some thousands of huge bats; and as the Muruts in the boats said that they valued them as articles of food, I shot a few—some of them measured $4\frac{1}{2}$ feet from tip to tip of wings.

At the next bend of the river we were hailed by a party of Peluans who had heard the shots, but they would not approach us for some time. At last they mustered courage, keeping well behind trees for fear of being fired at, and asked what we were doing in their country. The interpreter told them that there was a white man on board who was going to visit the chief Si Dolamit. They did not believe this, and said we were only deceiving them, and that they had assembled in large numbers. They then began hacking away with their swords at branches, this being their form of oath. They called out that if we took the same oath, by chopping off branches, they would come to us; but a sudden suspicion crossed them that we were playing false, and they suddenly called out, "We are off!" I took off my coat and walked out on the sandbank, showing, with my arms out, that I was not armed; but they made off all the same. This shows the distrust that exists between the Muruts and the Peluans, and that a mere wordy peace-making between them will not suffice.

We paddled on up-stream and arrived at Sungei Api, where the cliffs are about 60 feet high. The exposed section of the river-bank showed red earth from the surface to a depth of 10 feet, then 25 feet deep of yellow clay resting on horizontal layers of blue fire-clay and sand. No houses; fruit-trees plentiful. The main course of the Padas is now north and south, and it is said to take its rise in the Gura mountains, which are also reported to feed the Lawas, Trusan, and Limbang rivers.

No places of importance were passed until the river Padas suddenly narrowed to about 40 yards, with deep water in places, and hardly any perceptible current, the river being nearly on a level. It is dammed by some large sandstone rocks, one of which has all the shape of a dog's head. These rocks are called "Batu Uko," i. e. the Dog Rocks.

The Muruts, Peluans, and other savages have many interesting legends; and the following legend regarding the formation of the "Dog Rocks" may be taken as a sample of their folk-lore:—

Legend of the Dog Rocks:—There were formerly two houses, one on each bank of the river, at this place. The rocky steps leading up the bank to the houses are quite plain at this date. The house on the north bank had no fire, nor any means of lighting one, so the inmates called out to the people of the opposite bank to send them some. The latter said, "There is a great flood rushing by between us; how can we send

the fire?" The others called out in fun, "Oh! fasten it to a fowl." So the fire-stick was fastened to the fowl; but it set fire to the feathers of the fowl, which dropped in the rushing waters and was drowned. Then the people of the north bank laughed in derision at the simplicity of those people, and called out again, saying, "As you managed so badly with the fowl, fasten the fire-stick to a dog on the back of its neck." This was done, and the dog was lowered into the flood. Now the great spirit of the river was angry at the levity of these people, the more so as the mighty flood was rolling by, carrying with impetuous force the giant trees of the forest, and it was impossible for a poor dog to swim across such a raging torrent. As the dog was carried away to destruction, the people laughed louder than ever, when suddenly the dog, the houses, and the people, excepting a very pretty girl, were all turned into stone. The pretty girl was spared. Alas! for a few minutes only, owing to her covetousness. There was a brass gong on which she used to play, and she thought she would take it away, and run away. She lifted the gong to her shoulder, but had not moved many paces when she also was turned into stone. A rock detached from the house represents her transformation. A huge boulder jutting out from the bank is a very fair model of a dog's head.

On the night of the 21st June, 1885, we were camped on the bank of the Padas river at Api. There were fifty traders (Murut), constables, and followers in the party, and we were waiting for the arrival of the Peluan chiefs, especially Si Dolas, to come and make peace with the Muruts.

I had turned into my mosquito curtain, around which the sentry was walking his rounds, when a Peluan chief of the west bank, named Si Dolamit, a fine able-bodied fellow, arrived with ten followers. All carried spears, blow-pipes, and sheaths of poisoned arrows, and they had two rifles, muzzle-loading Enfields, stamped "Tower 1867." He brought me presents of water-melons and bananas, for which he received cloth and brass wire. His neck was encircled by many necklaces of coloured beads, and other bands of them passed round his head and forehead. He evinced great interest in my guns, as he is a great deer-hunter, and says he cannot live without venison or wild pork every day.

Another Peluan chief, named Si Ongandey, a bold warlike-looking fellow, carrying his blow-pipe and spear as though he was afraid of no man, arrived to take part in the peace-making. He wore numerous bead necklaces, and on his breast hung a number of charms, birds' beaks, shells, bears' claws, teeth, and bones of vampire-bats; he had fifteen followers and a few women and girls. The latter were afraid to come across the river, until Si Dolamit sent two of his wives across in my boat to fetch them. It should be noted that the bringing of women is a sure sign of peaceful intents among wild tribes.

Then the ceremony of taking oaths of peace and friendship com-

menced. The site on the high bank of the river under dark-foliaged fruit-trees was picturesque. The North Borneo flag was hoisted on a staff beneath a wide-spreading "langsats" tree, the clusters of its luxuriant fruit hanging like huge bunches of grapes. Behind the flag-staff stood three constables, and I stood in front with a few chiefs and traders; the Muruts sat cross-legged on the grass on one side, facing their ancient enemies the Peluans.

Then the Murut chiefs commenced taking the oath by chopping at a stick or sapling with great vigour, repeating the words of the oath in a loud voice, until towards the end they appeared quite excited. A Murut chief took the oath and then a Peluan, turn about, and as each oath takes six or seven minutes to repeat, it took a long time. The following is a *précis* of the form of oath, each mark + denoting a chop at the stick, until it is finally chopped up into little bits.

Form of Murut and Peluan oath:—"I follow the authority of the Government of the British North Borneo Company +. The Sandëwar + and the Peluan + people are now of one mind +. If I kill a Sandëwar (if a Peluan is swearing) man + when I go to the water may I not be able to drink + when I go to the jungle may I not be able to eat + may my father die + may my mother die + may my wife die + may my children die + may my house be burned down + may the padi not grow in my fields + may a crocodile swallow me + may the eggs never be hatched in my fowl-house + may I never catch a fish when I go fishing + may my life be ended + I cut this stick + as if I was chopping my own head off + the Great Spirit is my witness + may this stick grow into life again + if ever I kill or take any more heads + and I follow all the customs of the British North Borneo Company + and I take this oath with a sincere heart + and I shall pay the poll-tax of the Company +."

As the North Borneo flag fluttered above, these chiefs frequently pointed at it, and when the swearing of both Muruts and Peluans for everlasting peace was concluded all were friends and "long-lost brothers." The Peluan savages crowded round me begging for cloth, beads, salt, and brass wire, of which I had brought a small quantity. Before parting with any of my presents, I referred them to the traders who had accompanied me, explaining that my duties were purely Government work, that I had nothing to do with trade, and that all trading was left by Government to private enterprises. The traders had first a good time of it, and I subsequently made presents of all the coast products I had brought. The traders received guttapercha, camphor, beeswax, and indiarubber in barter for a few yards of cloth or brass wire, or parcels of coloured beads. Then the coast Muruts bartered salt for poisoned arrows, and as the Peluans opened their sheaths of poisoned barbs, there was much critical choosing and picking out of the best envenomed arrows. The Peluans are very clever at mixing the deadly

poisonous sap of the famous "epoh" trees, and their arrows were consequently in great request by the Muruts. The Peluan chief Si Ongandey very candidly told the mob, that it was fortunate that the "white man" had come with the Muruts; for if any of them had landed yesterday on the east bank of the Padas river, he would have had some of their heads; but, he added in a patronising way, "that Muruts can now enter my country with safety."

An amusing incident, illustrating the character of the people, took place whilst the Murut chief Panglima Prang (i. e. commander-in-chief) was taking the oath. He was chopping away at the stick, repeating the oath in a loud voice, when he came to the part "may my wife die" (if ever I take another head), when he stopped short and exclaimed with a grim smile, "I have no wife, you Peluans cut off her head long ago;" and the Peluans gave a shout of laughter in which he joined, the crowd around rolling about on the grass convulsed with merriment. This would denote that the retaliation in taking heads does not proceed from a spirit of affection for the departed relatives, but rather from a sense of revenge or *vendetta*, engendered by a feeling that shame has been cast upon the tribe by losing one of the family at the hands of an enemy.

The object of this journey in opening up the interior for trade was in some measure accomplished, and I returned to the sea-coast, crossing the range again at an altitude of 3200 feet. Many of these untutored savages have since come to Mempakol, the principal seaport of Province Dent; but much still remains to be accomplished in drawing to the sea-coast the rich products of the vast interior.

In concluding this paper, I would wish to mention that I have been describing more especially those tribes that inhabit the interior of British North Borneo.

Since the Company took over this vast extent of country in 1881, the presence of British officers carrying out a judicious form of government has put an end to individual acts of oppression among the sea-coast tribes, without in any way interfering with the personal freedom of the sons of the soil. They come to us for justice and protection, and we have every reason to hope that the inland tribes will in time follow their example, and learn to appreciate the blessings of civilisation under the magic of a Royal Charter.

In introducing the foregoing paper :—

The PRESIDENT said the paper was an account of explorations made in North Borneo by Mr. Daly, who had been employed for nearly five years under the British North Borneo Company, as one of their district administrators. The paper was of very considerable interest, and threw light on a practically unknown part of the world. In fact it might be said that, with the exception of part of Africa, Borneo and New Guinea were the two countries in which more geographical work remained to be done than in any other.

After the paper :—

Sir RUTHERFORD ALCOCK said Borneo was the great central island of the Eastern Archipelago. It was the largest island in the world, except, perhaps, New Guinea, and its history was both interesting and instructive. Exploring in an unknown country under the tropics was no holiday work. Mr. Daly had not only shown care, zeal, and industry in carrying out the chief object of his mission, which was to get some influence over the natives, but being a surveyor and a fair geologist, he had obtained useful information which was of geographical interest. The region he had travelled through was entirely virgin ground, having never previously been trodden by white men, and not many white men would follow him if they had to undergo the same vicissitudes as Mr. Daly did. The Eastern Archipelago had been the great scene of battle between all the European powers—Portugal, Spain, Holland, England. Strange to say, it was the spices to which so much value was attached. Borneo was once a very flourishing group of kingdoms, and Brunei, which now numbered only a few huts, formerly had 2000 houses and 25,000 inhabitants. There was then a flourishing trade between China, Japan, and North Borneo. The natives were then a fairly industrious race, but the Portuguese and the Spaniards, and afterwards the Dutch, were so bent upon keeping all the sources of wealth to themselves, that they used to burn or otherwise destroy the cloves and nutmegs which they did not want. The Spaniards compelled the natives not only to sell their goods to them at their own price, but to send to Manilla goods that were fitted only for the Chinese. The consequence was, the trade fell off, and the native chiefs, seeing they could not trade to advantage, took to piracy and head-hunting. Some retribution was owing to them, and the British North Borneo Company was engaged in a work which might in some way redress the balance. It was hoped that the natives would be brought back to pursuits of industry and the cultivation of the soil. Piracy was almost a thing of the past, and he trusted that in a very few years North Borneo would be restored to the flourishing condition in which it was a century and a half ago. Of course the officers of the Company travelled for objects of administration, but they had taken great pains and trouble to obtain information as to the state of the interior. In North Borneo there were ranges of high mountains, many fine rivers, and great sago swamps. It possessed some of the richest and most fertile soils in the Eastern Archipelago. There seemed to be nothing that grew in the tropics that would not grow there; and he hoped that in a few years the blessings of civilisation would be realised by the natives in consequence of the work of the Company.

Mr. TREACHER (Governor of British North Borneo) said he had known Northern Borneo for seventeen years. The paper which had just been read conveyed a faithful impression of the simple, amusing, though occasionally truculent, interior tribes, and the difficulties to be faced in reaching them. The members would, no doubt, concur with him in thinking that the climate was a healthy one for a tropical country, having regard to the healthy and hearty appearance of Mr. Daly after five years' such work there. It was not a climate in which the white man could, as a rule, perform hard work out in the open, and the superabundant unemployed of London would have no chance in Borneo. The actual outdoor labour must be left to Chinese (who were the best possible colonists for such a country, whether they were regarded as labourers or as capitalists and traders) and to the natives of India and Borneo. In the interests of North Borneo, of the European capitalists who were investing in land there, and of the overpopulated districts of India, it was to be hoped that the Indian Government would shortly see their way to sanctioning Coolie immigration into Borneo, as they had recently done in the case of the native states of the Malay Peninsula. For tobacco-growing, which was the principal crop at present cultivated by Europeans, Chinese labour was probably the

best, as it was work which called for both physical strength and intelligence, and the labour was paid for entirely by contract : each Chinaman having a small portion of land assigned to him, on which he sowed the seeds given him, bringing the crop, when ripe, to the manager for sale, the price varying according to the quality of the leaf. For such cultivation as coffee and tea, requiring much manual labour, Borneo would be somewhat handicapped in the competition with Ceylon and the densely-inhabited parts of Java, unless cheap labour could be obtained from India. The climate and soil had been found to be especially suitable for the growth of tobacco; and from experiments which had been made, it would seem that the temperature and the rainfall—two elements which had to be quite as much considered as the richness of the soil—made Borneo suitable for the growth of almost all tropical products. The kind of tobacco grown was not the cheap stuff ordinarily used for stuffing cigars or pipe-smoking, but the very thin, delicate, and elastic kind which was used for wrapping cigars, and which commanded a high price. It was the same as that grown in Sumatra by tobacco companies, which year after year paid dividends of 100 per cent. or more. In Borneo the cultivation was almost entirely in the hands of Dutch and Germans, and as every now and then the British public talked of the congestion of capital and the want of outlets, he could not understand why they did not send out to Borneo, and endeavour to participate in these alluring dividends. Perhaps they would in time. Tobacco-growing was no new thing in Borneo, the natives having grown considerable quantities for years past on the west coast. When he said that the climate was healthy he did not mean that all parts were equally so. The town of Sandakan, the capital, for instance, was certainly healthy for a tropical country, but when a new station was opened on virgin soil, there was, and always would be, a very considerable amount of fever; and, as a rule, the richer the soil the greater the amount of sickness. He thought he was right in saying that amongst all the Company's European officers only one death could be entirely attributed to climate. He supposed that most present had a general idea of the objects and position of the British North Borneo Company, but he had often been amused by questions that had been put to him with regard to it. When he was first appointed Governor he was asked by one gentleman, "Why have you been selected? You cannot plant coffee, can you?" An Oxford Don supposed he was going out to bully the poor natives, or form them into slave-gangs, and make them work for nothing on the shareholders' plantations. Another gentleman, who should have known better, set about the report that Indian warriors, Sikhs, had been hired to fight the natives, who were then compelled to buy Manchester goods at extortionate prices. He scarcely need say that there was no element of truth in any of these suppositions. The Company by its Royal Charter had the right to plant and to trade if it chose, as well as govern; but in this differing from the old East India Company, it at an early stage resolved to exercise its governing powers only, and to facilitate in every way possible the legitimate operations of traders and planters, who need not fear any Government competition. Trade was free to all flags. Hardly any trouble had been had with the natives. They were not numerous, considering the size of the country, and it had always been found that when they understood the objects of the Company, and the mode of government, they welcomed its representatives. Some of the tribes had had to be protected from head-hunting incursions by others, and once or twice authority had had to be asserted over tribes who had been led away by the tales of persons who were averse to any form of good government, such as were to be found in every country. The whole of Borneo was now under European domination—the Dutch holding by far the greater part, and England, through Rajah Brooke and the British North Borneo Company, the remainder, with the exception of a very small portion belonging to the Sultan of Brunei, who appeared to be in a somewhat sickly

state, wedged in between the boundaries of Sarawak and British North Borneo. The Dutch, for reasons best known to themselves, were taking no steps to encourage the opening of their portion of the island. Sarawak was flourishing under the rule of Rajah Brooke, and the last reports from British North Borneo showed, in the estimates for 1888, a surplus of revenue over expenditure, a result which must be considered most satisfactory, seeing that it was only in 1881 that the Charter was granted to the Company. In concluding his remarks he wished to mention Lieut. Witt, the Company's first explorer. He was an intrepid traveller and able observer, and lost his life in the service of the Company. He would also point out that though he had only alluded to the tobacco interest, European capital was also invested in Borneo in mining and the timber trade, and he hoped that the large deposits of guano in the wonderful caves would also be worked by European capital.

Sir RAWSON RAWSON asked Mr. Daly to give some description of the character and capabilities of the harbour of Sandakan.

Mr. DALY said the harbour of Sandakan, the headquarters of the Government, was by far the most important in British North Borneo. Seventeen rivers and streams emptied themselves into it. There was 26 feet of water on the bar at low-water spring tides, so that most vessels could enter with safety. Alongside of the jetty there was 22 feet of water. The town is situated on the north side of the bay at the base of some steep cliffs. Especial care was given at the first to the laying out of roads on proper gradients. The dimensions of the allotments were 33 feet of frontage by a depth of 66 feet. The upset price at auction was 16 dollars, and the annual quit-rent was 50 cents on each allotment. The principal warehouses and shops—some of them of brick—were built on piles over water; private houses dotted the slopes of a valley. The town was easily drained, and there was a permanent supply of pure fresh water running all the year round. The place was remarkably healthy. The natives had increased considerably in numbers, and the trade had greatly developed during the last six years. Speaking from memory, the population was composed, in round numbers, of 3000 Chinese, 600 Malays, 300 Sulus, 500 of native and other nationalities, and 30 Europeans. The harbour was about 15 miles in length and about eight miles in width. The Gomanton birds'-nests caves were 12 miles distant by path from the harbour. Excellent tobacco was grown at Suan Lambah on the south side, and realised a high price in Amsterdam. Around the Segaliud and other rivers the country is famous for its timber, especially for the ironwood known as "bilian," for which there is an export trade to China. When he left Sandakan in June last, there were three or four ships lading with timber for China and Australia. Government House stands on a commanding eminence, and among other buildings may be mentioned the Government offices, jail, police-quarters, hospital, two hotels, and the club.

The PRESIDENT proposed a vote of thanks to Mr. Daly. Whatever might be the prospects of the North Borneo Company in the way of extending commerce and civilisation, they certainly had a fine field for geography. Considering that the President of the Company had been President of the Royal Geographical Society, and that he was still a member of the Council, it would be a virtuous act on his part to stimulate the officers of the Government of North Borneo to carry out geographical exploration as far as possible. No doubt there were great difficulties in the way, but that should not prevent efforts being made to thoroughly explore the country. Even from the point of view of the Company's interest, the best thing that could happen to it would be to obtain a thorough knowledge of the resources of the country. The Geographical Society would be very happy to assist in the publication of any information which was obtained by the Company's officers.

*Notes of a Journey from Domasi Mission Station, Mount Zomba,
to Lake Namaramba, August 1887.*

By the REV. A. HETHERWICK, M.A.

Map, p. 60.

THE following notes may be interesting as an addition to the reports of Messrs. O'Neill and Last on the lakes that form the sources of the Lujenda river.

The journey was undertaken in connection with contemplated extension of the Mission of the Church of Scotland to East Africa.

I started on August 2nd from Domasi Mission, Mount Zomba, with a party of nine carriers. The station takes its name from the Domasi, the largest of the rivers that flow into Lake Shirwa on its western shore. Its source is on the northern side of Mount Zomba, about nine miles west from the mission station, and it takes its course down the pass between Mounts Zomba and Malosa. The latter mountain is delineated on none of the existing maps, although in height it equals Zomba (7000 feet), from which it is separated by a broad deep glen down which flows the Domasi. This river drains the northern slopes of Zomba as well as the northern and south-eastern slopes of Mount Malosa. From the northmost point of Zomba runs out a little hill, Mlinda, which shuts in the eastern mouth of the glen, except at the gap from which the Domasi issues, and thus forms a wide basin in which lies Kumjale, the principal village of Malemia, the chief paramount on Zomba and Malosa.

Crossing the Domasi—here about twenty yards broad—we rounded the south-east point of Malosa, and kept along its north-eastern slope, passing through villages belonging to Malemia. About two hours from Domasi Station we passed a hot spring flowing out of a fissure in the rock close to the side of the path. The water is lukewarm, and is quite pure and tasteless, although the people use it only for bathing purposes.

From Malosa the path led us across the plain that lay between that mountain and Chaoni. To our left lay Namabowe, a spur of Malosa, Chinduzi, and Mangolwe. All of these may be considered as belonging to the Zomba range. On our right rose Chaoni (5000 feet) and Chikala (6000 feet). The principal stream crossed on the route is the Lifane, a tributary of the Domasi, which drains the northern slope of Malosa. From the ravine which lies between that hill and Namabowe there issues the Likwenu, 30 feet wide at the ford where we crossed it. In the rainy season it assumes a considerable magnitude, being then about 20 yards wide, and from 15 to 20 feet deep. As it issues from the ravine, its course is at first north-east in the direction of Lake

Shirwa, but it soon turns to the west, and flowing round the western spur of Mount Chaoni, passes down to the Shire river at Nsapa.

On the second day, after leaving Domasi, we reached Pambanga, a few villages of Yaos, built on the northern slope of Mangolwe Hill. The place derives its name from a number of caves on the hill-side. From the hill higher up there have fallen into a deep ravine several large masses of rock, each several hundreds of tons in weight. These, piled one above the other in the ravine, leave large interspaces, which the people have utilised as a stronghold in event of war. Here they have built their grain-storehouses, and here, on the slightest rumour of danger, the women and children take refuge, while the men keep watch over the entrance. A plentiful supply of water flows through these caves, and the inhabitants are absolutely safe, as no enemy could possibly force his way into such a stronghold.

On the 5th we left Pambanga, and marched eastwards along the north slope of Mount Chaoni. In half an hour after starting we again crossed the Likwenu river. During the day we crossed several tributaries of this river, the largest being the Namikome. Up to four years ago the plain to the north of Chaoni was inhabited by villages of Machinga Yaos, but the invasion of the Magwangwara in 1883 drove them up to the hills for refuge. The whole country now is wilderness. From Chaoni northwards, the eye rests on a gently undulating plain, sloping westwards towards the Shire river. Many small streamlets intersect it, and a small hill rises occasionally from the plain, but there is nothing to break the view for forty or fifty miles, as far as the peaks of Likolilo and Unango. We camped that night by the Msambusi, a small stream that flows westwards to the Shire. Our altitude by the mean of two aneroids was 1970 feet.

Next day, soon after leaving camp, we crossed the ridge that forms the watershed between the Shire river and Lake Shirwa. This ridge, rising to a height of 230 feet above Lake Shirwa, runs northward from Chaoni to meet the hills that shut in the Lujenda valley to the north. On the western side of this ridge the waters drain to the Shire, while on the eastern the streams flow down to Lake Shirwa. The name of Makongwa is given to this ridge. As this watershed rises to a height of upwards of two hundred feet above Lake Shirwa, and from six to seven hundred feet above the Shire, there can be no possible connection between the two water-systems.

We were now quite close to Chikala, a precipitous hill about 6000 feet—the stronghold of Kawinga, the most powerful of the Machinga chiefs, and a noted slaver. It was he who in 1883 fought with the Magwangwara, and drove them back with considerable loss. The marauders were making for Blantyre and the English settlement on the Shire Hills, when Kawinga refused them a passage through his territory. Planting his forces on the rocky eminence that commands the pass

between the two mountains Chikala and Chaoni, he was able to beat back every attack, and finally the enemy drew off. Small-pox afterwards broke out in their camp, and they returned home in greatly-diminished numbers.

From the Shire-Shirwa watershed, the path led down a gentle slope for several miles, passing through the ruins of several large villages deserted for fear of the Magwangwara. The inhabitants have moved away, some to the hills, some to the shores of the lake, so as to be near a place of refuge in case the marauders should return. Many fine tracts of country here, once inhabited by Yao and Wa-nyanja, are now lying waste. Yet these migrations are almost a necessity. The native practice of cutting down the forest and burning the wood as manure for the gardens, precludes the possibility of any district being inhabited for any length of time. A few years at most will strip a district of almost all its timber, and then the native is driven to a fresh quarter where the forest is untouched. It takes fifty years for the bush of any district to attain to any size after being once cut down, and during that time the land must lie fallow. A fixed population means improved methods of agriculture, so also does any increase in the number of inhabitants, for the land suffices only for its present population.

After crossing the Shire-Shirwa watershed, a few hours' march brought us to the villages of Kawinga at the foot of Mount Chikala, and from thence we kept north-east, crossing the Naminga, Nambazi, Ngande, and Mikoko rivers. These drain the eastern slope of the watershed. The largest is the Mikoko, which in the rainy season must be a considerable stream, but at the time of our crossing it was only a few feet broad.

From Chikala to the river Ngande the path led through a succession of villages inhabited by a mixed population of Machinga and Wa-nyanja.

The Machinga form one of the subdivisions of the Yao tribe. Their original home was on the Machinga Hills, on the left bank of the Lujenda. About the year 1860 they were driven southward by the Makuwa. They kept along the mountain range, and being better armed, they drove out the Yao on Mangoche mountain. These latter—the Mangoche Yao, as they are called, or Achinamdowita—fled southward to Zomba and the Shire Hills, driving out in their turn the original inhabitants of the land, the Wa-nyanja or Mang'anja. These either found a refuge with the newly-settled Makololo chiefs on the Lower Shire, or retired to the islands and shores of Lake Shirwa. It was this Yao migration which caused the tribal wars of Livingstone's time, and brought trouble on the newly-founded Universities' Mission at Magomero.

The Machinga invaders followed up the retreating Mangoche Yao, and took possession of the country to the north of Chikala and Lake Shirwa. In 1865 they were alarmed at the approach of a Zulu or

Angoni invasion from the south under Chikuse. The army crossed the Shire below Lake Pamalombe, and proceeded north to the hill country east of Lake Nyassa. The Machinga on hearing this fled for refuge to the Upper Shire where on the islands and in the swamps they could live where no enemy dare approach them. Here they remained three years. Meantime the Angoni had met the Magwangwara, and by them had been driven back. Thereupon they turned eastwards to the Makuwa and Lomwe country, ravaging and devastating to within a short distance of the coast. Turning back they recrossed the Shire in 1868, and settled in the Chipeta country round Mount Domwe, where they still remain. The Machinga thereupon returned to the West Shirwa Hills, and took possession of Chikala and Zomba. Any of the original inhabitants—the Wa-nyanja—who remained either became subject to them or retired to join their fellow-tribesmen on Lake Shirwa.

These Wa-nyanja go by the name of Ampotola, and their language is the wide-spread Chi-nyanja with a few dialectic variations. They were the original inhabitants of the river and lake district, and when the Yao invasion dispossessed them of their country, they either yielded to the conqueror or retired to the shelter of the river-banks or lake-shore. To the north of the lake and about Chiuta and Namaramba they have mixed with the Yao, but on the east and west shores of Shirwa, as well as on the islands, they maintain a precarious independence. On the hills east of the lake a subdivision of the same tribe goes by the name of the Maravi.

The villagers on the shores of the lake subsist largely by fishing. The rivers are systematically fished by net and poison. A net is stretched across the river at a deep part, and the fish are driven into it by beating the water and the water-reeds near the bank with long poles. During the rainy season, when the river is in flood, a fish poison is used, decocted from a species of legumen. This is put into the water some distance up the stream, and the fish being stupefied or killed by the poison, are washed down into the net. A vast quantity of fish is destroyed in this way. The people make them up in bundles, and carry them up to the hill-country for sale. As much as a man can carry of these is worth here about a fathom of calico.

Salt-making is also engaged in. The soil on the surface is scraped, and put into a percolator made of bamboo basketwork. The liquid that percolates through is evaporated, leaving a coarse salt. The article is also obtained by percolating the lye of a species of rush that is found close to the water, but the salt obtained by the former process is of much better quality.

On the 7th we left the Ngande river, and in an hour after starting crossed the Mikoko, the last of the streams that flow into Shirwa from the north. The path we followed led along a low wooded ridge called

Chelomoni. This ridge is about a quarter of a mile in width, and extends along the north shore of the lake to within a few miles of the north-east corner.

At present, the waters of the lake have receded several miles from this ridge, but in 1860, when the Machinga first settled here, they found open water close up to it. The actual ridge is about forty or fifty feet above the level of the surrounding plain. It is composed of fine loamy soil thrown up by the lake, and in consequence vegetation is abundant. *Borassus* palms, dwarf palms, *euphorbias*, grow profusely. The *kombe* plant (*Strophanthus*) also is abundant—a species pronounced by Mr. Buchanan to be different from that he collects on the Shire. *Kombe* is also found at the mouth of the Domasi and Zungani rivers, and the natives say it can be gathered also on the Lujenda.

On the south side of the ridge there flows a small stream, the *Namawano*, running along the south edge of the ridge westwards, and discharges its waters into Lake Shirwa. It flows only in the rainy season, and gathers its waters from the ridge. There may possibly be also a slight drainage through the soil from the swamp on the north. This swamp, called *Ntorendenga*, extends along the plain on the north side of Chelomoni ridge. Opposite our camp on the *Namawano* it was about a mile in breadth, narrowing towards the east and west. Tracing it westward to find if there was any communication between the swamp and Lake Shirwa, we found a small watercourse coming from the north-west, which in the rainy season pours a considerable quantity of water into the swamp. But for the obstacle presented by the Chelomoni ridge, this stream would flow into Lake Shirwa, instead of gathering and forming the *Ntorendenga* swamp. Finding no outlet into Shirwa, the swamp discharges itself to the north into Lake Chiuta. Thus the low ridge forms the watershed between the Lujenda and Lake Shirwa. On the one side we have the Mikoko and the *Namawano* streams, flowing into Shirwa, and on the other we have the *Ntorendenga* swamp, discharging its water into Lake Chiuta. Between the two water-systems there is no connection. Hippopotami and crocodiles, it is said, pass over the ridge from the swamp into the lake, but with the exception of the possible drainage into the *Namawano*, *there is no communication between Shirwa and the Lujenda.*

Although no connection exists at present, there is enough of evidence to show that at one time their waters were continuous. The broad flat expanse of the Shirwa plain must have at one time formed part of the lake bottom. Then Mpyupyu and Pirimiti were islands in the water as Chirwa and Tongwe are to-day. Then too Shirwa found an outlet to the north, and its waters added to the volume of the Lujenda. Gradually—from some diminution in the rainfall or other such cause—the waters of Lake Shirwa fell, and became so shallow that a sandy ridge appeared above their surface just where Chelomoni ridge now lies.

The prevailing south wind causing a drift of the waters northwards, increased the silt on this ridge. At some period after the connection with Lake Chiuta was thus broken off, the waters of Lake Shirwa must again have risen to a considerable height, thus piling up the silt on the ridge and raising it to its present height above the plain. Then there came a second fall which has continued ever since, and the swampy shore of Shirwa yearly grows broader.

Lake Shirwa thus presents the spectacle of a huge evaporating-pan. Taking its southern limit to be $15^{\circ} 37'$ S. lat., the total length would be 38 miles, and its greatest width is not more than 16 miles. About eight miles south of the southmost point there is another small marsh-lakelet, Limbe, first seen by Mr. Henderson and myself in 1884, lying at the foot of Mauzi Hill. This discharges into the Sombane, which flows into Shirwa. The total area is not more than 350 square miles. The water is exceedingly shallow. This year it is said to be possible to walk from Chirwa Island to the mainland, so shallow has the intervening water become. When I visited the island in 1884 the depth here was about 20 feet.

There are four islands in the lake, Chirwa or Chisi, the latter name just meaning "the Island," Tongwe, Chidiambiri, and Njalo. There is near the south end a small hill which in the rainy season stands in the water. Of these the largest is Chirwa, in length two miles, and in breadth one mile. Its greatest altitude above the surface of the lake is 500 feet. Vegetation is scanty, and cultivation almost nil. On the narrow strip of beach are planted the villages of its Wa-nyanja inhabitants, who have crowded here for shelter from the Yao invader. The population numbers about 3000, who subsist chiefly by fishing and salt-making. The second largest island is Tongwe, with a population of about 300, chiefly Wa-nyanja, with a sprinkling of Wa-nguru or Wa-lomwe from the east shore. A like number live on Njalo, while Chidiambiri is uninhabited. A year ago, one of Malemia's headmen built a village on the shore of the lake at the mouth of the Naisi river, and many of the inhabitants of the islands are crossing to the mainland to live under him. In this way there is a hope of their being able to better their present wretched condition.

On the 9th we left the north-east corner of the lake and struck northwards towards Lake Chiuta. The ridge before alluded to has here almost disappeared, and only a low sandy shrub-covered beach swept round southward along the eastern shore of the lake. Soon after leaving Madziabango at the north-east corner, we crossed a small plain two miles in breadth, called Mgongondo. This, in the rainy season, becomes a swamp, discharging its water into Chiuta. It is evident that the connection between Shirwa and Chiuta was last severed here, there being only a very slight rise in the ground between this plain and the lake to the south. On the 10th we crossed Tambo Plain that lay

between us and the southmost point of Lake Chiuta, and reached the villages on its eastern shore.

Here, again, the inhabitants are a mixture of Machinga and Wanyanja, the former being the intruders who have made themselves masters of the country. Towards the end of the rainy season the whole plain becomes a swamp, so that the people are compelled either to build their houses on piles, or on the tops of the ant-hills. Storehouses for grain are also built on piles out in the lake, so as to be safe from the Magwangwara, who are the terror of the whole of the Lujenda district.

Lake Chiuta is the name given to the open expanse of water that forms the head-waters of the Lujenda river. The name, like that of Namaramba, in reality belongs to the surrounding country, and is applied to the part of the Lujenda river which assumes the lake-like aspect. Two islands, the one 150 feet, and the other 30 feet in height, rise out of the open water. The largest of these only is inhabited, and forms a place of refuge in time of danger. The open water is divided into two by a narrow tongue of land running into it from the south. The name Mpiri is given to the sheet of water that lies to the west of this. The same name is also applied to a small river which is said to flow into this from the group of hills to the west of the lake. The north limit of the lake is in lat. S. $14^{\circ} 42' 27''$.

On the 11th we left the villages on Chiuta, and followed the right bank of the Lujenda. Our course at first was north by west as far as lat. $14^{\circ} 38' 47''$ S., where the river turns round to the N.N.E. The open water of Chiuta gave place to a slow sluggish stream about 500 yards broad, the water being completely hidden by a strong marsh grass that grows in the bed of the river. The name Lujenda is applied to the whole river from Ntorendenga swamp, and Mpiri onwards, but to this narrow reach between Chiuta and Namaramba the name Msimbiti is applied. On the right bank of the river the ground rises in a very gentle slope, while about two miles from its left bank rise the Mlindi Hills. Beyond these tower the peaks of Unango, Likolilo, and Ipani. Beyond these again we could just discern the summit of Mount Mangoche. The left bank of the river is here uninhabited, the people having crossed over so as to be safe from the dreaded Magwangwara.

On the 13th we reached the open water of Lake Namaramba, in lat. $14^{\circ} 32' 45''$ S. Opposite Chikweyo's village the river opens out to about a mile or a mile and a half in width, forming the lake to which the above name is applied. Here we find that the inhabitants have built dwelling-houses, as well as grain-storehouses, on piles in the lake. Every householder has thus his water-dwelling, as well as his hut on land. The most powerful chief on Namaramba is Chikweyo, who has settled there only within the last few years, and has gathered a large population into his villages. The rightful owner of the country is,

however, Napulu, who lives close at the foot of Lipembegme Hill, some ten or twelve miles down the river. All the chiefs in this district pay tribute to the Magwangwara.

We reached here the limit of our journey, and on the 16th we turned our faces homewards, following for the most part the route we had already travelled over.

Indian Marine Survey, 1886-87.

THE record of the Marine Survey of India for 1886-87 commences with the return of the *Investigator* from Western Torres Island, Mergui Archipelago, in March 1886, after which she completed the survey of the southern approach to Mergui, taking in some twenty miles of the beaten track to the south. By the 16th of April sixty square miles of soundings had been carried out, forty linear miles of coast soundings and tidal observations on twenty-one days. The two volcanic islands, Narcondam and Barren Island, were next visited, and radiating lines of soundings were carried out from both these islands to ascertain their slope to the floor of the ocean. It was found that they rose from a depth of 1140 fathoms, but that the north-east slope of Narcondam was being encroached upon by the outlying banks from the rivers flowing into the Gulf of Martaban. A bottom temperature at 1010 fathoms showed $41^{\circ} 2' F.$, which is the average temperature found at only 760 fathoms. As the cold of the great ocean depth is due to the flow of Arctic and Antarctic waters towards the Equator, and as it has been frequently shown that this flow, having been warmed by passing over a bottom ridge and thus raised to a higher temperature, never loses it again on its descent into deeper beds, it follows that this portion of the Bay of Bengal is shut out from the great depths to the westward of the Andamans, and that no greater depth than 760 fathoms exists in any of the passages between the Andaman Islands or between that group and Acheen.

In November 1886 a visit was paid by the *Investigator* to Yé river and Hinzé basin, between fifty and sixty miles south of Amherst. The latter basin proved to be deep, and apparently accessible to moderate-sized steamers, but the off-lying shoals are numerous and would require not less than four buoys, which would have to stand considerable sea, even in the fair season. The survey of Pakchan was not attempted, as it would have taken the *Investigator* party three months, or a boat party five months, to survey it thoroughly. The beaten track is no doubt of use to local trade, and gives protection to vessels trading to Singapore, but it is unsuitable for large and deep draught-vessels until thoroughly surveyed on a large scale, which the trade does not at present require. On Christmas Day a visit was paid to the Elephant Islands close to the south of Domel. The former are composed of a marble of medium quality, and are very remarkable both for their abrupt slopes and the beautiful grottoes they contain. The grottoes are mostly only open at low water, tunnels below high-water mark opening into lofty caves. The total area charted was 515 square miles, on the 1-inch scale.

After some weeks' trawling, a start for the Megna flats was made on the 31st of January. Here an area of 1750 square miles was charted on the scale of four miles to the inch, the whole survey being astronomical, no land being in sight. The result was very satisfactory in showing more water nearly everywhere than in the published charts, and no extension of the prominent shoals. Indeed, the shoal elbow in long. $91^{\circ} 20' E.$, which is a sort of bugbear to vessels trading between

Calcutta and Chittagong, does not project within six miles of its charted position. The total out-turn of work of the Marine Survey for 1886-7 consists of eleven charts and plans, while the *Investigator* has run in all 4450 linear miles of soundings. Great aid was derived from the coast triangulation which has been carried down by the Trigonometrical Branch of the Land Survey of India from Balasore to Masulipatam, and which has saved so much labour that great hopes are entertained that the triangulation will be continued down to Madras.

A boat survey party, under Lieutenant E. Helby, R.N., carried out in the early part of 1886 a survey of the channel between the Narbada river and Perim Island in the Gulf of Cambay, amounting to 65 square miles, while 10 square miles were charted in Mandwa Bay, Diu Head. In October 1886, the party was transferred to Beyport, and a survey of the Malabar coast from $2\frac{1}{2}$ miles north of Calicut to three miles south of Beyport, on the scale of three inches to the mile, was carried on until the 15th of December, when a move was made to Calicut. While the party were at Beyport the boats were anchored inside the river which is a very safe and convenient harbour for small craft, though the bar at the mouth was often impassable for several days. The datum for the reduction of tidal observations and soundings was referred to the bench-marks of the Great Trigonometrical Survey, and the tidal observations taken there during the survey were found on comparison to agree very closely with the published tide tables. An examination of Cotta point and reef was also made, the entire season's work of this boat party for the four months covering 139 square miles, and including 155 tidal observations at three places.

The principal work of No. 2 boat survey party, first under Staff-Commander T. C. Pascoe, R.N., and then under Mr. Simpson, consisted of the survey of the approaches to Yé river, on a measured base, on a scale of four inches to a mile, extending $4\frac{1}{2}$ miles north and $7\frac{1}{2}$ miles south of the river. In spite of severe sickness among the party this work was carried on until the close of January, when the survey of the river was commenced.

Dr. G. M. Giles, the medical officer and naturalist, was away from the Marine Survey during the greater part of the year under review, having been deputed to serve with the Chitral Kafiristan Mission, hence the scientific results and collections were but scanty.

GEOGRAPHICAL NOTES.

Discoveries in British New Guinea.—The Catholic missionaries recently established in Yule Island have made an excursion into the mainland opposite, in the course of which they have discovered an important river, named St. Joseph, rising at the foot of Mount Yule and flowing south. The natives of the villages were most friendly; in all, fifteen were visited, containing a total population of more than 2000 inhabitants. The rivers Hilda and Ethel, which empty themselves into Hall Sound, were explored for some distance, and found to be comparatively unimportant streams. An ascent of Mount Yule, in company with Dr. Edenfeldt, is contemplated.

Explorations in German New Guinea.—Admiral von Schleinitz has made an excursion of 160 miles in Kaiser Wilhelms Land and another in New Britain, where he discovered a low-lying plain of considerable
No. I.—JAN. 1888.]

D

extent, with fertile soil and intersected by navigable streams. He has also surveyed Rook Island. Dr. Hollrung at the end of last year effected an exploration of the country round Hatzfeldt Haven, extending his tour to Cape Gourdon. A month or two later he made a journey from Constantine Harbour in Astrolabe Bay. The natives he found were still cultivating the numerous vegetables and plants which were introduced there some years ago by Miklucho-Machay. At the same time Dr. Schrader surveyed a considerable portion of the country in the vicinity of Constantine Harbour. Last spring Dr. Schrader, at the head of a scientific expedition, explored the coast between Juno Island and Cape Croisilles. Though this part of the coast is deficient in good harbours, the anchorages are safe, and a landing can be generally easily effected.

Dr. Meyer's Ascent to the Foot of the Crater-wall of Kilimanjaro.—Further details concerning this interesting ascent, to which we briefly referred in our November number,* are contained in a preliminary report from the pen of the traveller himself, which, together with an excellent sketch map, is published in the current part of Petermann's 'Mitteilungen.' Leaving Taveta on 2nd July, in company with Lieutenant von Eberstein, he arrived two days later at Mareale's village at the south-eastern foot of the mountain, where the sultan received him in a most friendly manner. After several days' stay he started on the ascent with three native guides from the village and twenty-two men. At about 5900 feet he passed the last banana plantations, and at 6600 feet entered the rain-drenched primeval forests, from which, on the second day, he emerged on to the grass belt bordering the upper edge of the forest. Up to this point his direction had been north, along the path leading from Marungu across the mountains to Useri. He now turned to the north-west, following more or less the border of the forest. At the end of the second day he found himself at Johnston's old camping-place (9800 feet), where for the first time he was able to get a clear view of Kibo and Kimawenzi in all their beauty. On appealing to the natives to accompany him further, eight volunteered to carry his tent, instruments and provisions, &c., to the snow-limit. Crossing grass-covered lava-fields, in which rushing streams of snow-water had hollowed out valleys in many places nearly 200 feet deep, he reached on the third day the middle of the saddle connecting Kibo with its companion peak. Then following the course of a lava stream, he arrived after some 6000 paces at a more level part of the saddle, where between immense boulders the upper course of the snow-water streams was indicated by green meadows. Here he saw the last trees of *Senecio Johnstoni* growing in the bed of one of these watercourses at an altitude of 13,200 feet. Keeping along by this brook for about 2000 paces, the traveller came upon the first traces of snow near some great lava rocks,

* p. 682.

where he pitched his tent. On the morning of the fourth day he set out with his three native companions, the other men refusing to proceed further. After about 3000 paces in a northerly direction he suddenly found himself at the foot of a wild much-broken hill, which gave rise to the lava stream upon which he was then standing. At the same time he became aware that he was much nearer to Kimawenzi than to Kibo, and consequently made a sharp turn to the north-west. A little later on he discovered five other hills of a similar character running between the two peaks in an almost semicircular line, from each of which streams of old lava or ashes run southwards. Having marched across some of these lava courses he reached the little crater nearest to Kibo, at the foot of which he pitched his last camp, the altitude being 16,100 feet. The three natives were sent back to his previous camp, and the two Europeans passed a sleepless night alone in their small tent, the temperature falling to 12° Fahr. On the morning of the fifth day they commenced to ascend the dome of Kibo, then rising before them with nothing intervening. Still preserving the same direction (north-west), and marching for three hours across lava ridges, they came for the first time upon a continuous snow-field, which regularly fills up the level valleys situated between the mighty lava streams. As far as Dr. Meyer could judge, this was the point reached by Johnston in 1884, and a little further north the snow-field where Count Teleki had to turn back exhausted. Up to this time the air had been clear and the snow firm; soon, however, the effect of the sun's rays was seen in the light clouds which floated across the mountain, partly obscuring the peak. The travellers were compelled to make frequent short halts to regain their severely-taxed strength; Dr. Meyer took these opportunities for recording observations with his aneroid barometer and thermometer, from which he was able to ascertain that they were then considerably above 16,500 feet. Unfortunately the clouds became thicker and thicker, completely hiding the upper portion of the summit. The temperature also fell quickly from 46° Fahr. to 27°, and at the same time a violent storm of sleet burst upon them, obliterating their footprints, and rendering their situation critical. The storm had not lasted three-quarters of an hour when Lieutenant von Eberstein sank down completely exhausted. Calculating that they could not now be far from the wall of the crater, Dr. Meyer determined to push on alone through the drifting snow, in spite of exhaustion, giddiness, and palpitation of the heart. At length he reached another point where one snow-field passes into a fresh one; but this proved to be the last. About 170 feet higher he discovered for the first time large isolated ice-blocks, and then soon after, where the ground was less steep, he came upon a gigantic field of fragmentary ice, on the further side of which, about 70 feet in front of him, he saw rising up a blue ice-wall, which, with the aid of his glass, he had been able to observe from below. As far as he could see through the blinding sleet,

this wall was about 120 feet in height, and stretched away to the left and right, the top being almost horizontal. Being alone, the scaling of the wall was quite out of the question ; so the traveller consoled himself with the reflection that he had actually ascended the upper edge of the mountain, although the ice-crust resting upon it had prevented him from looking into the interior of the crater. He was thus unable to say whether the interior was completely filled up by the glacier. Nevertheless, he is of opinion that this is more than probable, considering the geological formation of this volcanic glacier-cavity, and also the fact that the blue ice-wall on the north-east side of the mountain continues round the east and south sides. After the traveller had taken observations with his barometer and thermometer, and made some rough sketches with benumbed fingers, he returned in great haste to the spot where he had left his companion, only to arrive there himself in a half-fainting condition. After a short rest he recovered (von Eberstein having in the meanwhile determined the boiling point of water with his thermometer), and the two travellers made a rapid descent in the still sleeting rain. Fortunately striking the right direction, they managed to regain their tent in seven hours. The following morning was spent in exploring the northern side plateau between the two peaks, and a series of photographic views were taken of the latter and the line of small hills. He perceived to his regret that the north side of the mountain was almost completely free from snow. The travellers then returned to their larger tent, which had been pitched on the lower snow-limit, and some days later arrived at Mareale's village.

Sete Kama, West Africa.—We obtain the following interesting information on Sete Kama from a private letter addressed to Mr. E. G. Ravenstein, by our old contributor Mr. R. B. N. Walker, who first paid a visit to that district of Western Africa in 1851, and has been resident there since 1885.—Sete Kama extends from the mouth of the Ndogo Lagoon ($2^{\circ} 28' S.$) to Asega or Punta Pedras ($2^{\circ} 45'$). The Portuguese explain the name as meaning "seven beds" (*sette câmas*), with reference to seven sailors who are said to have died there. The European factories extend for about three miles along the beach. That of Messrs. Hutton and Cookson ($2^{\circ} 30' S.$) is the most northerly, and was established in 1873 by Mr. Walker; next follows the new French "Poste," built since October 4th, 1887, when the *Pourvoyeur* landed a commandant and a detachment of black troops; next follow the factories of Herr Karl Wörmann, Mr. W. M. Lynstager (who is a coloured gentleman of Dutch extraction, educated in Scotland), and of Messrs. J. Holt & Co. All these factories maintain sub-stations on the Ndogo lagoon, which has its present mouth in $2^{\circ} 28' S.$, the old mouth having become silted up during the last three years. In proof that the land is gaining upon the sea, Mr. Walker states that in 1869 he discovered, at Ngové, an old ship's anchor, upwards of a mile from the shore. Mr. Walker appears

to think that this anchor belongs to one of the earliest Portuguese exploring vessels, and it is a pity he was unable to carry it away with him. The Ndogo lagoon is of great extent, and abounds in islands, some of which are inhabited. European factories have been established upon two of them, viz. Lubinda (called Owinda by the Kama, and Abinda by the Europeans), and Sanze. About five miles due north of the latter the Orembâ ("river") falls into the lagoon. It has two mouths, but one of them is "orunde" (tabooed), and the natives avoid it. Up this river are the districts of Obongo (Owângâ of the Kama), Isyira (inhabited by the Misyira or Misira, on the north bank, and Ivârâma.—Mr. Walker keeps a regular record of the temperature and the rainfall. The temperature, as far as observed, ranges between 64°·2 F. (August 1st, 1887) and 102° (January 1886) in the shade. The dry season just past (in October) has been one of the longest and most severe that Mr. Walker can remember for thirty-six years' residence in Africa. The rains, however, are occasionally very heavy. On January 10th, 1887, 7·25 inches fell between midnight and noon; and on the 23rd of the same month, 9·7 inches fell in the course of twenty-four hours.—The Balombo (called Alambo by the Mpongwe), who inhabit Sete Kama, speak a dialect which has much greater affinities with the language spoken to the north of the Equator, by the Benga, Kombe, Batanga, Diwalla, &c., than with those of the intervening tribes (Nkômi, Orungu, Mpongwe). The people of Kaputa and Ngové, immediately to the north of Sete Kama, speak a dialect almost identical with that of the Balombo. The Balombo have a week of four days, viz. Motânlâ, Mosyilo, Moduga, and Sânlâ, the last being their Sunday. Weeks of four days, Mr. Walker says, are frequent in various localities of the West Coast, as, for instance, at Lahow.

In the following vocabularies *â* is to be pronounced *aw*; *ty* has nearly the sound of *ch*; *ũ* represents a compound of *v* and *w*, often resembling a *b*; and the *l* in *nlu* or *nlo* is at times very indistinct.

	NGOVÉ.	BALOMBO.
1	mâsi	ifimba.
2	Vai-i	bei.
3	biraro	bireru.
4	binla	bina (binla).
5	luranlo	biranu (biraulu).
6	sambanlo	bisamunu.
7	isambuai-i	sambwali.
8	dwillanla	dinana (dinanla).
9	ipu-a (ipoa)	ipwa (ipoa).
10	digumi	igumi.
11	digumi-nla-mâsi	igumi-nla-difimba.
20	magumi-ma-vai-i.. .. .	agum'abei.
100	kama-magumi	kama.
Person, mankind	moto (tu), pl. batu .. ..	..
Man	diVagala	dibagala.
Woman	mogêtu	mogetu.
Infant	muanla .. .. .	..

	Ngové.	BALOMBO.
Father	rara .. .. .	.. .. .
Mother	nguyi .. .. .	.. .. .
Freeborn	mwatyi .. .. .	.. .. .
Slave	kotyi .. .. .	.. .. .
Head	mūra .. .. .	.. .. .
Eyes	misu	disu, pl. misu.
Mouth	monua	musu.
Teeth	muilu	minu.
Tongue	luvimi .. .. .	.. .. .
Hands	dikanda .. .. .	.. .. .
Fingers	milemba .. .. .	.. .. .
Heart	mosima .. .. .	.. .. .
Saliva	matē .. .. .	.. .. .
Perspiration	rejaku .. .. .	.. .. .
Blood	mēnga .. .. .	.. .. .
God	anyambia (-biē)	njambi.
Devil	onyambē	ditengā.
House	tyuwu .. .. .	.. .. .
Door	digugi .. .. .	.. .. .
Roof	mwatyatya .. .. .	.. .. .
Ridge-pole	morāla .. .. .	.. .. .
Bed	gityiga .. .. .	.. .. .
Pillow	gilila .. .. .	.. .. .
Mortar	gisū .. .. .	.. .. .
Pestle	mojāgi .. .. .	.. .. .
Fire, heat	ruvia	ruvi.
Water	mamba	mamba.
Sun	diumbe	diyumbe.
Moon	tysongi	ngandé.
Stars	mbuēlēle	mbwelila.
Daylight	ofianda .. .. .	.. .. .
Night	otūgu .. .. .	.. .. .
Sky	tyambi .. .. .	.. .. .
Wind	luvuga	duvuga.
Cloud	givineli .. .. .	.. .. .
Rainbow	mogianina .. .. .	.. .. .
Rain	mpela	mvula.
Thunder	tyatyatuva	idami.
Lightning .. .. .	.. .. .	njasituba.
Dry season	mangala .. .. .	.. .. .
Rainy season	dityatya .. .. .	.. .. .
The sea	moŋo .. .. .	.. .. .
River	lurembā .. .. .	.. .. .
Lagoon	winya-geliŋa .. .. .	.. .. .
Island	ilili .. .. .	.. .. .
Gorilla	mbēlo .. .. .	.. .. .
Chimpanzee	tyigo .. .. .	.. .. .
Sheep	didāmbē	idāmbē.
Goat	taŋa	tuba.
Pig	nguluŋi .. .. .	.. .. .
Fowl	koko (kākā)	koko.
Grey parrot	kūsū	kusyu.
Green parrot	kūsū-akiāmbo .. .. .	.. .. .
Eat .. .. .	.. .. .	makayia.
Drink .. .. .	.. .. .	akaganu.

Angra Pequena. — The Bay of Angra Pequena will henceforth be known by the German Colonial Society for South-west Africa as "Lüderitz Bay," in recognition of Herr A. Lüderitz's services in connection with German Colonial enterprise in South Africa.

A new Route from Antotto (Shoa) to Harar.—A letter from the French traveller, M. Arthur Rimbaud, has reached the Geographical Society of Paris, giving a sketch of a new and direct route followed by him from Shoa to Harar, through the fertile country of the Itu-Galla, thereby avoiding the dangerous and almost impracticable route through the territory of the marauding Danakil. Finding himself unable to return to the coast by the latter route, the traveller obtained King Menelik's permission to strike across the country to Harar, recently annexed by the latter. Leaving Antotto, accompanied by M. Jules Borelli, he crossed the high cultivated tableland to the east, which lies at an altitude of about 8000 feet, the route being to the north of the peak Herer. Then descending some 2500 feet he entered the rich plain of the Mindjar, beyond which the country becomes hilly and the soil less fertile. A further descent was made to the Cassam. The road, cleared by the king to the breadth of nearly 35 feet, then lay through forests of mimosas, the haunts of elephants and wild beasts, and diverged towards the Hawash. The region on both sides of this river, for a distance of $2\frac{1}{2}$ days' march, is named Careyön, and is peopled by Bedouin Galla tribes, continually at war with the Arussi. The distance from Antotto to the Hawash is about 130 miles. Beyond the latter the traveller proceeded through a beautifully wooded, but little cultivated district, and gradually ascending, soon found himself at an altitude of 6500 feet. The territory of the Itus through which he now passed forms a high tableland, with meadows and extensive forests, intersected by numerous valleys crowned with magnificent woods. On account of its fertility and mild climate this region is well suited for European colonisation. Near Chalauko the highest point of the march was attained, at an altitude of 8500 feet. From the Hawash to Harar the distance is 180 miles. The general direction of the route was between N.N.E. and S.S.E., and the total journey of 310 miles was accomplished in 18 days with a convoy of mules, but couriers perform it on foot in 10 days. The result of this expedition is calculated to destroy somewhat the exaggerated expectations aroused by some travellers as to the commercial value of these regions. In the opinion of M. Rimbaud, navigation is impossible on the Hawash, even at the time of its highest waters. The entire route was surveyed by M. Jules Borelli.

Manitoba.—From the Report of the Census of Manitoba taken in July 1886, it is seen that the area of the province has been reduced from 123,200 square miles to 60,520 square miles since the Census of 1881, the remainder having been added to the province of Ontario and

the district of Keewatin. On the area which remains the population has increased from 62,260 to 108,640 in five years.

Influence of Forests on Rainfall.—Mr. H. F. Blanford has been continuing his investigations on this subject in India, already referred to in 'Proceedings' for 1887, p. 191. He refers to the extreme difficulty in disentangling the various causes which affect rainfall, and discusses data collected by the Meteorological Department in various parts of India. Mr. Blanford's paper appears in the 'Journal of the Asiatic Society of Bengal' in advance of publication of his Administrative Report for 1886-7. The general conclusion which he draws from the facts set forth in his paper is, that while no one of the instances cited fulfils the requirements of scientific proof, the tendency of the evidence they afford is uniformly favourable to the idea that the presence of forest increases the rainfall. The evidence is of three kinds. First we have that of a large province (the Central Provinces), about five-sixths of which have always been a great wilderness, but in which, in the first ten years of the period of registration, the forest growth was greatly devastated. For the next ten years destructive operations were suppressed, and the visible result is a forest growth of such vigour and luxuriance as to attract the attention of the Inspector-General, when on his tour of inspection, to the question of the probable effect on the rainfall. During these last ten years the rainfall of the province has progressively increased until it would appear to amount to 20 per cent. more than the average of the first ten years. The second instance is that of two pairs of comparative observatories, established on the Ebermeyer plan, in near proximity to each other on the skirts of the Sivalik forests, six miles from Dehra Dûn; one of each pair being within, the other without the forest, on open ground. Notwithstanding their proximity, in most months the outer observatories show a slight excess over the inner. Lastly there is the case of a forest, 50 miles south of Lahore, between the Ravi and the Jhelum, artificially produced by irrigation in a region so dry that cultivation is rendered possible only by irrigation. Seventeen years' registers, at a station within the forest, show an excess of six per cent. over the probable rainfall of that station, as computed from the registers of two stations, one of which is 4 miles, the other 13 miles distant from the forest, and both on the borders of cultivation. The evidence thus to hand, Mr. Blanford states, is not rigorously conclusive, but such as it is, it tends to support and confirm the conclusions drawn *à priori* from general physical conditions. "It justifies, I think, at least, the view I have already expressed elsewhere, namely, that I can no longer regard the long suspected influence of forests on rainfall as a question of equally balanced probabilities."

International Geological Congress.—The fourth meeting of this Congress is to be held in London in 1888, commencing the 17th of

September. The central place of meeting will probably be the Lecture Theatre of the Jermyn Street Museum. An organising committee has been formed, of which Professor Huxley is the Honorary President and Professor J. Prestwich, President, Mr. F. W. Rudler, Treasurer, and Messrs. J. W. Hulke, F.R.S., and W. Topley, General Secretaries.

REPORT OF THE EVENING MEETINGS, SESSION 1887-8.

First Meeting, 14th November, 1887.—General R. STRACHEY, R.E.,
President, in the Chair.

DISCUSSION ON MR. A. D. CAREY'S PAPER:—"A JOURNEY ROUND CHINESE
TURKISTAN AND ALONG THE NORTHERN FRONTIER OF TIBET."

(For the paper *vide* 'Proceedings,' December 1887, p. 731.)

Before the reading of the paper,

The PRESIDENT said that Mr. Carey, the author of the paper, was a Civil Servant in India, who entirely at his own expense and risk started on a journey in Chinese Turkistan, which occupied him about two years. He travelled over a distance of about 4750 miles, between longitude 77° and 97°, that is nearly 20 degrees of longitude, and half as many degrees of latitude. It was one of the most remarkable journeys that had been made by any English traveller in that part of the world for a very long time.

In the absence, in India, of Mr. Carey, the paper would be read by his brother, Mr. A. E. Carey, C.E.

After the paper,

General J. T. WALKER, R.E., said that the wall-map which had been prepared to illustrate Mr. Carey's paper showed the course of his journey very clearly, and no doubt very accurately as regards the relative positions of the places visited; but it did not profess to give any indication of the relative elevations of the regions which Mr. Carey traversed. This, however, was a matter of very considerable importance for a correct appreciation of the varied conditions under which the journey was accomplished, as the range of elevation happened to be very considerable; thus, in the plains of Chinese Turkistan, and on the Gobi Plateau, the elevation could rarely have exceeded 4000 feet, and must have generally been much less, whereas in Northern Tibet it was at least four times as great, the difference in height being sufficient to account for differences in climate and in the physical aspects of the two regions, as great as are usually met with between tropical and arctic regions. Tibet, it should be remembered, is a country not only of great extent, but also of great altitude; it is probably the most considerable protuberance of the earth's crust which exists anywhere on the surface of the globe; its area exceeds 700,000 square miles; its extreme length from east to west is about 2000 miles; its breadth from north to south ranges from a minimum of 150 miles on the extreme west to an average of 600 miles in the central and eastern portions; and the average altitude all over probably exceeds 14,000 feet. It may be broadly divided into three longitudinal zones which increase in altitude from south to north; a southern zone, from 10,000 to 12,000 feet above the sea, in which are situated the famous city of Lhasa and all the towns and villages which are the centres of the settled and agricultural population; a middle zone, ranging in altitude from 12,000 to 14,500 feet, which

comprises the pasture lands of the nomad or migratory population of Bodpas, or pure Tibetans, under the government of Lhasa; and a northern zone, ranging from 14,500 to 17,500 feet above the sea, which is partly occupied at certain seasons by Turkic and Mongolian nomads, but is mostly abandoned to wild animals. It is this northern zone, which is called the Chang-tang or Northern Plain by the Bodpas of Southern Tibet, that was crossed in various parts by Mr. Carey, on his way to and from India, and also in excursions southwards from Chinese Turkistan. Starting from Leh, the capital of Ladakh, he proceeded eastwards to the Changchenmo Plateau, and then struck across the uninhabited tract of lofty tableland, 16,000 to 17,000 feet above the sea, which lies between Rudokh and Khoten; this route lay considerably to the east of any route previously travelled by a European, but had been successfully traversed in previous years by one of the Pandit explorers of the Indian Survey. It crosses the Kuen-Lun range, which constitutes the northern scarp of Tibet, and then descends into the plains of Eastern Turkistan. The crossing is between the meridians of 81° and 82° , to the west of which the range is well known from actual survey; eastwards, up to the meridian of 90° , it is almost unknown, but it probably lies to the north of the 36th parallel, and has first a north-easterly and then an easterly direction. After journeying from Khoten round to Lob Nor, through the northern portion of the Tarim basin, Mr. Carey struck southwards towards Tibet, having, however, to cross the Altin Tagh and Chaman Tagh ranges, and the vast uninhabited plateaus between them, before he could reach the Kuen-Lun scarp and again attain the great plateau of Northern Tibet. He appears to have crossed those ranges by a route some distance to the west of that taken by Prejevalsky, and afterwards to have struck at right angles across the celebrated Russian traveller's westerly route, when exploring a plateau, between the Chaman Tagh and Kuen-Lun, to which he has given the name of the Valley of the Winds, and along which he believes lay a route of importance in ancient times from Turkistan to China. After travelling for some distance eastwards along the foot of the Kuen-Lun, under circumstances of great privation, Mr. Carey succeeded in discovering a path across the range into the valley between it and the Khokosili range to the south, and eventually he struck the trade route between Koko Nur and Lhasa a little below the Angirtakshia Pass, by which it crosses the Kuen-Lun. He travelled down this road towards Lhasa as far as the Ma Chu river, and he was then compelled by the failure of his supplies to turn northwards when still at a distance of about 400 miles from Lhasa. Prejevalsky from the same point had struck southwards to the Nag Chu river, within 200 miles of Lhasa, when he was turned back and had to retrace his footsteps. Mr. Carey, travelling northwards from the Ma Chu, went for some distance along the line of the route taken by Pandit A—k, and then explored an entirely new line of route westwards to Hajjar and northwards to the Chinese town of Saitu or Sachu. In the course of his travels he has explored a considerable amount of new ground, and rendered very valuable services to the science of geography.

Colonel H. YULE said that he feared whatever he had achieved of a geographical kind would hardly be admitted by our modern experts to be "geography" at all. Anyhow, if he had in any way helped to advance geography in regard to Central Asia it had always been like a man rowing a boat, looking backwards! Knowledge of that region had increased very rapidly of late. It was about twenty-five years ago that he first began to study its geography, which was then excessively dark. A little was known generally about the character of the great basin called Chinese Turkistan, from Humboldt's 'Central Asia'; but the sort of information given there—though as a rule true enough—was not such as was required for accurate map-making. Mr. Michell's 'Russia and Central Asia' really marked the starting-point of more exact knowledge regarding this region. Previous to that, in order to

get ideas as to the fixing of places, the student had to go back to old Arabic itineraries, to mediæval travellers, and to the Jesuits of the last century. When Mr. Michell's book was published, one of the appendices to it consisted of a new edition from some records that had been discovered at Peking of the Jesuit latitudes and longitudes of the towns of Turkistan, and this was considered to contribute rather valuable data for maps. Then came various adventurous travellers from British India, beginning with Mr. Johnson, who was the first from the Indian side to reach Khoten and Kiria. The next was the lamented traveller Robert Shaw, and after him Sir Douglas Forsyth, and Colonel T. Gordon; Adolph Schlagintweit (he had almost forgotten) preceded all of these, but did not live to bring back any intelligence of his discoveries. In Burma and many other countries it was the custom when a new city-gate or palace was founded to bury a victim under its posts, and very much the same seemed to be the case in opening up new geographical enterprises! Schlagintweit was put to death in Kashgar, just as Augustus Margary was when opening the route between Burma and China. Gradually a considerable amount of knowledge had been obtained about the geography of this part of Central Asia. An account which he (Colonel Yule) had written of the region, chiefly derived from Michell's book, twenty-two years ago, corresponded almost clause by clause with the description Mr. Carey had given of the great horseshoe basin, full of sand in the centre, with a border of clay and stony soil, and studded with fertile oases at considerable distances from one another, in which the towns were planted. Going back to the early centuries of our era, we heard of most of these towns from the Chinese Buddhist travellers towards India. At a later period Marco Polo took us through Kashgar, Yarkand, Khoten, Charchand, Hami, Sachu, and so into China. In the first years of the 17th century a Jesuit, Benedict Goes, mentioned the names of several of these cities, which he passed through in going from Yarkand to China, but they could not be mapped. We read in Tennyson's forecast, written fifty years ago, that

"The individual withers, and the world is more and more."

But the puzzle and misfortune of our day proves to be that it is the *world*—or at least the *state*, the community—that withers and degenerates, whilst the individual does *not* wither! We can hardly think so when we see such feats of enterprise and endurance as this just achieved by Mr. Carey! He (Colonel Yule) looked with the greatest satisfaction upon the journey described in the paper, and he was pleased to know that an Englishman from India had accomplished it. He believed too that, before long, tidings would be received of a young military officer who had travelled through the same region.

Sir THOMAS WADE expressed his heart-felt satisfaction at hearing such a good account of the re-establishment of Chinese authority in the countries that Mr. Carey had visited. He rejoiced first, of course, for the sake of China herself; but a separate and perhaps a meaner ground of satisfaction was this, that when any similar possessions of China happened to be disturbed, an immense war-tax was levied on the Chinese; in which case English traders were considerable sufferers. He might add that the less the commercial community suffered the happier would be the condition of Her Majesty's representative at Peking.

The PRESIDENT expressed the thanks of the Society to Mr. Carey, to his brother who had read the paper, and to Mr. Dalgleish, to whom in reality they were indebted for the map of the region traversed by Mr. Carey. It was a remarkable thing that at the present time so vast a portion of Asia extending from the Arctic to the Indian Ocean should be in the hands of three foreign nations, and that the Chinese should be able to exercise their authority over such an extent of country, at such a distance from the centre of their government, with apparently such an extremely

small physical force. He was astonished when he thought of the actual condition of the great central waste which had been described in connection with the so-called hordes of Tartars and Mongolians, who were said to have swept through Turkistan and to the westward with Jenghiz Khan. Where did they come from? Was it possible that they could ever have existed in such a region, or had the physical conditions of the country altered? Western Turkistan was known to have undergone a great change, and might it be that Eastern Turkistan had also greatly altered?

Second Meeting, 28th November, 1887.—General R. STRACHEY, R.E.,
President, in the Chair.

PRESENTATION.—*James T. Jarvis, Esq.*

ELECTIONS.—*George Webb Appleton, Esq.; John A. M. Bonar, Esq.; Charles Bright, Esq.; William Fredk. Buchanan, Esq.; J. Mortimer Buckland, Esq.; James Stewart Butters, Esq.; John B. Carrington, Esq.; Robert Ingham Clark, Esq.; John Henry Cooke, Esq.; Rev. John Corr; William T. Crutchley, Esq., B.N.B.; Captain Leonard Darwin; Paolo Dattari, Esq.; Professor John Simeon Elkington, M.A.; Patrick Fleming Evans, Esq.; Hugh A. Ferguson, Esq.; Harry Seymour Foster, Esq.; George Gordon, Esq., C.E.; Major-General T. E. Gordon, C.B.; George S. Griffiths, Esq.; Rev. Samuel Thorn Gwilliam; Surg.-Major Thos. Edgerton Hale, B.A., M.D., V.C.; Robert Charles Hannan, Esq.; William Hawley, Esq.; George Wilson Heath, Esq.; Wm. Hicks, Esq.; Joseph Forsyth Ingram, Esq.; Robert Landale, Esq.; Alex. Lowe, Esq., M.A.; Justin H. M'Carthy, Esq.; Eben Wm. M'Gavin, Esq.; Edwin Merrill, Esq.; Hugh Miles Milman, Esq.; Waller Robert Fitzgerald Moore, Esq.; Macleod Clement Orbell, Esq.; Josiah Pierce, Esq., jun., M.A.; Major W. Hutcheson Poë, C.B.; Samuel Hartshorne Ridge, Esq., B.A.; Percy Sanderson, Esq. (H.M. Consul-General for Roumania); Baron von Schwerin (Professor of Geography at the University of Lund); Frank Scurr, Esq.; Eli Sowerbutts, Esq.; J. Duncan Stoward, Esq.; Major-General Algernon A. Stewart, R.A.; Rev. Frederick Olinthus Sutton, M.A.; James Tees, Esq.; Alexander Patterson Waugh, Esq.; Daniel Wellby, Esq.; Major R. Whalley; Edgar Whitaker, Esq.; Harry Willis, Esq.*

The paper read was:—

“A Journey round Chinese Turkistan and along the Northern Frontier of Tibet.” By A. D. Carey. (*Ante*, ‘Proceedings R.G.S.’ 1887, p. 731.)

Third Meeting, 12th December, 1887.—General R. STRACHEY, R.E.,
President, in the Chair.

PRESENTATIONS.—*Charles Bright, Esq.; Josiah Pierce, Esq., jun.*

ELECTIONS.—*Felix Lyde Ames, Esq.; E. A. Baselon, Esq.; Thomas Breen, Esq.; Edward M. Curr, Esq.; Major James Cecil Dalton, R.A.; The Earl of Fife, K.T.; Henry Glenny, Esq., J.P.; Harry E. Griffiths, Esq.; William Marshall, Esq.; Edwin Roper, Esq.; Wm. Godfrey Shaen, Esq.*

The paper read was:—

“Explorations in British North Borneo, 1883–87.” By D. D. Daly, Esq. (*Ante*, p. 1.)

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Berlin.—December 3rd, 1887: Herr W. REISS in the Chair.—A Report from Dr. H. Meyer on his ascent of Kilima-njaro was read. He started from Mombasa, and reached Taveta on 28th June, by way of Teita. It was his original intention to commence the ascent from Moshi, Mandara's village. Profiting, however, by the experience of Count Teleki's unsuccessful expedition, which he met at Moshi, the traveller determined to make the attempt from Marenga, in the territory of the Sultan Mareale. The latter personage received the party in a friendly manner. On the second day after leaving Marenga, the traveller, having taken the path which leads from Marenga across the mountains to Useri, arrived at Johnston's camping-place, where Count Teleki also had rested. The plateau from which Kibo and Kimawenzi rise, contains also six smaller craters, and is covered with ashes, lava, and other ejected matter. On reaching the first traces of snow, at about 13,000 feet, the traveller sent his Zanzibar porters back to Johnston's camping spot. He himself, together with his companion Lieutenant von Eberstein, passed the night of the 10th July alone at the foot of Kibo, at an elevation of 15,400 feet; the temperature falling during the night to 12° Fahr. (— 11° Cent.). On the fifth day after the departure from Mareale's village the ascent proper began. The valleys between the mighty lava streams are filled up with genuine glaciers. The furthest points reached by Johnston (1884) and Count Teleki were passed after three hours' climbing. A mist with sleet showers soon after enveloped the travellers and rendered their situation critical, it being very difficult to keep the proper direction. Lieutenant Eberstein shortly after sank down exhausted, while Meyer pushed on about 650 feet higher, reaching an extensive field of fragmentary ice, beyond which rose a blue ice-wall from 110 to 130 feet high, which comprised the whole eastern edge of the crater. Inasmuch as the scaling of this wall under the circumstances was out of the question, he returned, and after a stay of several weeks in the upper regions of the mountain, reached Mareale's village. The tableland between Kimawenzi and Kibo is about 4½ miles broad, and 3 miles long from north to south. The six smaller volcanic elevations above mentioned, which lie in a line between the two peaks, divide the plateau into two parts; the larger portion to the north consists of a great level plain of mud and ashes, the other and smaller division lying to the south is intersected by lava streams. While on the south and south-west sides of the mountain the glacier boundary lies at about 15,400 feet, according to Kersten's measurements, the traveller found it on the east and north-east sides to be about 18,000 feet. Nowhere could the traveller find any traces of recent volcanic activity, nor the hot springs mentioned by Johnston, the descriptions of which, considering the constitution of the saddle and of the highest parts of the mountain, it seems difficult to reconcile with the facts. Above 14,700 feet no spring was observed. From Mareale's village, the natives of which during the whole time preserved a friendly attitude, the traveller proceeded through Kahé and Little Arusha along Fischer's route to Pangani. With better equipment Dr. Meyer hopes in the course of next year to be able to climb to the top of the Kibo crater.—Herr Baumann then addressed the meeting on the subject of his exploration of the island of Fernando Po. Although situated on the great commercial route, its interior was, he said, still little known. Neither the Spanish nor the Portuguese had recognised the importance of this island. The trade of Santa Isabella, the chief town, rested entirely in English hands. The Spanish officials led a contemplative life; the Spanish Catholic mission had no success to point to, while the English Methodist mission had been driven away through religious intolerance. The coast population, Poto negroes, the

descendants of freed slaves, have come from the continent in large numbers. Standing in strong contrast with the latter are the good-natured, moral Bube, the aborigines of the island, who have remained undisturbed by civilisation, and upon whom the Spanish Government has no influence. Their behaviour towards the traveller was friendly; only when the latter attempted to penetrate into the residence of King Mokka they were more intractable, because it is said that Mokka must die as soon as he sees a white man. The villages of the Bube consist invariably of several distinct groups of buildings, a larger meeting-house for the men, fenced-in huts for the women and children, and separate little huts for the half-grown boys, the latter being a proof of the morality of the Bube. They carry wooden spears and stone-throwing weapons, with which they hunt antelopes, squirrels, porcupines, &c.; there are no beasts of prey. They do not know the commercial value of mandioca or the oil-palm so frequently met with, but cultivate only yams and bananas. Their villages are never found on the coast. King Mokka, to whose influence it is due that civil wars among the Bube have ceased, calls together assemblies of the people, in which all disputes are settled; the crime of murder is punished with death. Situated on the Bay of San Carlos is the flourishing cocoa plantation of W. A. Vivour, a Sierra Leone negro, which is of such importance that English steamers call there several times in the course of every year. From this point the traveller proceeded over the southern cordillera to the unhealthy Bahia de la Concepcion, and traversed the uninhabited deserts in the south-west of the island. He then marched across the tableland of Kantabaré, in the east of the island, and back to Santa Isabel through the region of the mountain peaks. Herr Baumann, who is also personally acquainted with the regions of the Upper Congo, is of opinion that the volcanic parts of the Guinea coasts, with their relatively good harbours and great fertility, offer a much more favourable prospect for the establishment of plantations than the Upper Congo territory, situated many hundred miles from the coast.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

The Alps.—*Zeitschrift des Deutschen und Oesterreichischen Alpenvereins.* Jahrgang 1887, Band xviii. München, 1887.

There are several papers in this volume of distinct geographical interest. Dr. Penck's memoir on the Brenner is very complete, and has been issued in a separate form. Dr. H. J. Bidermann devotes thirty-five pages to the Upper Pusterthal, while Dr. Pfandler writes on the present boundaries of the Alpeiner Glacier in the Stubay mountain group; and Dr. Finsterwalder and Dr. Schunck, on the Suldensfeld Glacier, and F. Seeland, on the Pasterze Glacier. There is a useful paper by A. Waltenberger, on mountain surveying, and another on observations of heights and depths by tourists. Anton Spechler continues his papers on the Lechthal Alps. The numerous maps, panoramas, and illustrations are in themselves of real geographical value.

Cunningham, C. D., and Captain Abney, R.E., F.R.S.—*The Pioneers of the Alps.* Sampson Low & Co., 1887: 4to. Price 2l. 2s.

This volume is a collection of illustrated biographical notices of some of the guides who have shared in opening out the Alpine region above the snow-level.

As a record of Alpine guides, the work is rendered imperfect by its limitation to those whose homes lie in the valleys of the Pennine and Oberland Alps. As a collection of portraits, it suffers from the absence of any likenesses of "pioneers" no longer living. These might have been supplied by woodcuts. At present the only deceased climber represented is Mr. Coolidge's dog Tachingel! Nor can the intention of the authors, that the first generation of great guides should be celebrated by those with whom their names are constantly associated, be held to have been carried out in a work from the list of contributors to which the names of Whymper, Wills, Tuckett, Leslie Stephen, Tyndall, and A. W. Moore are absent. Again, the deceased guides are placed last—an arrangement naturally fatal to anything like historical sequence in the volume as a whole.

Subject to these reservations, this collection of biographies gives a very fair picture of the conquest of the Alps, of the progress from the time when the ascent of Mont Blanc passed for an heroic or an insane act to that when untrained tourists attempt the Matterhorn. The contributors for the most part write with sympathy as well as knowledge of their companions and friends, and in many instances succeed in bringing out the character of the man as well as the feats of the guide. In any future edition, the preface, which purports to be a sketch of mountaineering, should be rewritten. It embodies some entertaining extracts from an Alpine scrapbook, but the original portion is unsatisfactory in substance and slipshod in style, and the comments on the Alpine Club are at once out of place and misleading. The writer shows himself imperfectly acquainted with the constitution and action of the Society he criticises.

Captain Abney's photographs are admirably reproduced by a permanent process. The portraits are, for the most part, life-like, and the smaller plates of incidents in mountain travel are generally very successful. Two of these, however, the collapsed tourist being plied with alcoholic stimulants (in the frontispiece) and the Whymper tent, pitched in a most unworkmanlike fashion (on the back of page 113), are perhaps intended, and must certainly be taken, as warnings, and not as examples.—[D. W. F.]

[**Geodetic Institute.**—Veröffentlichung des Königl. Preussischen Geodätischen Instituts. Präcisions-Nivellement der Elbe. Dritte Mittheilung. Auf Veranlassung der Elbstrom-Baubehörden von Preussen, Mecklenburg und Anhalt im Auftrage des Königlichen Geodätischen Instituts ausgeführt und bearbeitet von Prof. Dr. Wilhelm Seibt. Mit einer Tafel. Berlin, P. Stankiewicz, 1887: 4to., pp. 139.

[**Murray's Handbooks.**—A Handbook of Rome and its Environs. Fourteenth edition. With more than fifty plans and maps of the city and environs. London, John Murray, 1888 [1887]: post 8vo., pp. (x.) and 571. Price 10s.

The present edition has been thoroughly revised and brought down to the latest date. Several new plans have been added.

[**Salvator, [Erzherzog] Ludwig.**—Paxos und Antipaxos im Ionischen Meere. Würzburg und Wien, Leo Wörl, 1887: 4to., pp. xv. and 480. [Presented by the Author.]

This is one of those luxurious and richly illustrated works of a monographic character, for which the Archduke Salvator has acquired a well-deserved reputation. His Highness spent a considerable time in the two interesting islands in 1884-5, and the instructive results of his observations and his researches are given in this handsome volume.

[**Saxony.**—Kalender und Statistisches Jahrbuch für das Königreich Sachsen, nebst Marktverzeichnissen für Sachsen und die Nachbarstaaten auf das Jahr 1888. Herausgegeben vom Statistischen Bureau des Königl. Sächs. Ministeriums des Innern. Dresden, G. Heinrich, 1887: 12mo., pp. 91, xii. and 261.

Trautwein, Th.—Register zu den Publicationen des Oesterreichischen Alpenvereins 1863 bis 1873, des Deutschen Alpenvereins 1869 bis 1872 und des Deutschen und Oesterreichischen Alpenvereins 1873 bis 1886. München, 1887: 8vo., pp. iv. and 44.

ASIA.

Blanford, Henry F.—Report on the Meteorology of India in 1885. Calcutta, 1887: 4to., pp. vii. and 315. [Presented by the Government of India.]

This volume contains some useful geographical notes on the many places in India and its neighbourhood at which meteorological stations have been established.

Colquhoun, Archibald B., and Holt S. Hallett.—Report on the Railway Connection of Burma and China; with Account of Exploration-Survey by Holt S. Hallett. London, Allen, Scott & Co. [1887]: folio, pp. 239. [Presented by the Authors.]

Apart from the railway scheme which it is meant to advocate, the volume contains much carefully compiled information on the geography, the people, and the resources of the interesting region with which it deals. Indeed, of the 239 pages, only 46 are directly concerned with the scheme. All the rest of the volume is occupied by Mr. Hallett's most instructive account of his exploration survey in Burma and Siam. His narrative is of the most detailed character, and is amply illustrated with maps and woodcuts.

Growse, F. S.—A Supplement to the Fatehpur Gazetteer. Allahabad, North-West. Provinces and Oudh Government Press, 1887: 8vo., pp. (3) and 43.

Hunter, [Sir] William Wilson.—The Imperial Gazetteer of India. Second Edition. Trübner & Co., 1885-7: 14 vols. 8vo. Price 3*l.* 3*s.* [Presented by the Secretary of State in Council for India.]

Sir William Hunter is to be congratulated on the rapidity with which he has brought out this new edition. The original nine volumes have expanded into fourteen, and the whole work has been thoroughly revised and brought up to date. Even during the issue of the present edition many important changes have taken place, including the addition of Upper Burma to our Indian Empire. These Sir William Hunter refers to in a postscript printed in the last volume. As a gazetteer the work is a model, and an invaluable compendium of information on India.

[India.]—Archæological Survey of Southern India. [Vol. i.] The Buddhist Stupas of Amaravati and Jaggayyapeta in the Krishna District, Madras Presidency, surveyed in 1882, by James Burgess, LL.D., &c., Director-General of the Archæological Survey of India. With translations of the Aśoka inscriptions at Jangada and Dhauli, by Georg Bühler, Ph. D., &c. London, Trübner & Co., 1887: 4to., pp. ix. and 131. [Presented by the Secretary of State in Council of India.]

This volume is handsomely illustrated with photographs and woodcuts.

Izvestija Vostochno-Sibirskago otdiela Imperatorskago Russkago Obshestva, tom. xvii., Nos. 3 and 4. Proceedings of the East Siberian Section of the Russian Geographical Society, vol. xvii., Nos. 3 and 4, pp. 228. Irkutsk, 1887.

This number contains the following articles:—On the Contemporary Position of the Gold-mining Industry at the Olekminsk Placers, L. A. Karpinsky; Materials for the Archæology of the Central Course of the Yenisei, N. V. Savenkof; Report of Dr. Kirilof on his commission of inquiry into the Fisheries of the Selenga; Opinion of V. E. Yakovlef on Kirilof's Report; Communication on the Caves on the Biriussa, A. Ellenef; besides minor notices. In

the same number are two diagrams of the delta of the Selenga and one of its fishing-stations, besides three lithographed drawings to accompany M. Elleneff's paper.—[E. D. M.]

Lansdell, Henry [D.D.].—Through Central Asia, with a map and appendix on the Diplomacy and Delimitation of the Russo-Afghan frontier. London, Sampson Low & Co., 1887: 8vo., pp. xix. and 668. Price 12s. [Presented by the Publisher.]

This is a popular edition of Dr. Lansdell's large work in two volumes on Russian Central Asia. It deals mainly with his own journeys, the more scientific part of the larger work being omitted. Dr. Lansdell has done a good service by adding a chapter on the history of the Diplomacy and the Delimitation of the Russo-Afghan frontier. This has cost much time and labour in searching Blue-books and other authorities, and will certainly be extremely useful for reference.

Layard, Sir Henry.—Early Adventures in Persia, Susiana, and Babylonia, including a residence among the Bakhtiyari, and other wild tribes, before the discovery of Nineveh. London, John Murray, 1887: 2 vols. 8vo.; vol. i. pp. [8] and 490; vol. ii. pp. [8] and 511. Price 24s. [Presented by the Publisher.]

In 1884 Mr. E. L. Fittou published a narrative of 'A Land-march from England to Ceylon Forty Years Ago,' in which he frequently refers to his "companion," whose name, however, he never mentions. That companion was Sir Henry Layard, who in these two volumes gives his account of the journeys, in which, however, he deals almost entirely with the travels undertaken by himself. The journeys here described by Sir Henry Layard were made so long ago as 1841-3. Much has been done in Palestine since that time, but even here, and still more when dealing with South-west Persia, Sir Henry's information is by no means out of date. The book is so attractively written and so full of adventure, that it is sure to be popular. But apart from that, Sir Henry lived so intimately with the people of the countries through which he wandered, that he obtained an unusual insight into their character and ways. Even on the banks of the Jordan and on the eastern shore of the Dead Sea he has much to tell that is quite worth putting on record. Amid great dangers from the wild natives he spent many weeks sojourning up and down Palestine from Jerusalem and the Dead Sea to Damascus. From Damascus he went on to Aleppo and Bagdad, and crossed over, at much risk, to Persia, making for Ispahan. At Kala Tal, to the south-west of Ispahan, the headquarters of the chief Mehemet Taki Khan, he spent much time. He saved the life of Mehemet's boy, and so made the chief his warm friend. He had exceptional opportunities of seeing the inside life of the family, and his copious notes on this subject are among the most interesting parts of the narrative. Moreover, he made frequent excursions into Khuzistan, mainly to explore its antiquities, but at the same time making many observations on its geography and its turbulent peoples. Altogether the work is a welcome addition to the literature of this part of the world. It contains several maps.

[**Tiflis Magnetical Observations.**—Magnetische Beobachtungen des Tifliser Physikalischen Observatoriums in den Jahren 1884-5, herausgegeben von J. Mielberg, Director des Observatoriums. Tiflis, 1887: 8vo., pp. lx., 80, and 80.

AFRICA.

Allan, George.—The Land of the Duallas. Notes of Life in the Cameroons. Newcastle-upon-Tyne, Andrew Reid, 1885: 12mo., pp. 60. [Presented by the Author.]

These sketches originally appeared in the *Newcastle Daily Chronicle*. Chapters I. and II. deal with the German Annexation. Chapter III. The Land of the Duallas; including the position of the country, its tropical character, trade at the Cameroons, its probable development by Germany. Chapter IV. Life at the Cameroons. Chapter V. The Duallas. Chapter VI. Sketches of Dualla Life. Chapter VII. Concluding Notes.

No. I.—JAN. 1888.]

Baumann, Oscar.—*Beiträge zur Physischen Geographie des Congo.* Wien, Hölzel, 1887: 8vo., pp. 25. [Presented by the Author.]

This is a separate reprint of papers contributed by Dr. Baumann to the Vienna Geographical Society. He divides the course of the Congo into four regions:— (1) The Central African Plateau Region, from Stanley Falls to Cape Two Palms; (2) the Transition Region from Two Palms Cape to Stanley Pool; (3) Livingstone Falls Region down to M'boma; (4) the Estuary Region down to the coast. Each of these regions Dr. Baumann treats of in some detail.

Blyden, Edward W.—*Christianity, Islam, and the Negro Race.* London, Whittingham & Co., 1887: 8vo., pp. vii. and 423. Price 10s. 6d.

The volume is mainly a reprint of papers contributed by the author, who is a native of Liberia, to various journals. It really discusses Africa and the African from many points of view, and apart from its value as a contribution to a highly interesting subject, contains much that ought to interest the student of the wider geography.

Fournel, Marc.—*La Tripolitaine. Les Routes du Soudan.* Paris, Challamel Aîné, 1887: 8vo., pp. 272. [Presented by the Publisher.]

M. Fournel, being interested in Tripoli, paid a visit to it, or at least to the town of Tripoli and its neighbourhood. In the present little volume he brings together much useful information on the country, its people, climate, and productions; on the town of Tripoli and its environs; on the government of the country, and its commerce and industry. In a concluding section to the first part he discusses the various routes into the Soudan, and adds a series of notes on the Tuarej. The second part, of about 40 pages, deals with the subject of Islam in Africa.

Lagos (West Africa).—Correspondence respecting the War between Native Tribes in the Interior and the Negotiations for Peace conducted by the Government of Lagos. Presented to both Houses of Parliament by command of Her Majesty, February 1887. London, Eyre & Spottiswoode, 1887 [c.—4957]: folio, pp. vi. and 154. Price 3s. 2d.

Contains the following maps:—Sketch-map showing the Boundaries of some of the Tribes concerned in the War; Diagram showing Position of Routes through Jebu Remo and Jebu Ode to Ibadan; Sketch-map showing the Towns and Camps of the belligerent Native Tribes and the Route taken by the Government Messengers.

— Further Correspondence respecting ditto. (In continuation of [c.—4957], February 1887.) Presented to both Houses of Parliament, &c., 1887 [c.—5144]: folio, pp. iv. and 88. Price 2s. 3d.

Includes the following maps:—Rough Sketch showing Kiji and Ekitiparapo Camps; Route Survey through Yoruba Country. By Harbour-Master William C. Speeding, who accompanied the Special Commissioners H. Higgins and O. Smith from the Government of Lagos to Tribes interior of Lagos, between 17th August and 10th November, 1886.

Mackenzie, John.—*Austral Africa, Losing it or Ruling it. Being Incidents and Experiences in Bechuanaland, Cape Colony, and England.* 2 vols. London, Sampson Low & Co., 1887: 8vo., pp. (vol. i.) xii. and 515; (vol. ii.) viii. and 525, maps and illustrations. Price 32s. [Presented by the Publishers.]

In these two volumes the author presents us with a mass of political and historical matter bearing upon South Africa. There is not much geography in the volumes. The following enumeration of the principal subjects embraced will give a general idea of the scope of the work. Book I. Illustrations of Native Life and European Expansion, including, a History of the Batlaping, 1802-1884; History of the Barolong, 1812-1884; English Military Occupation and Settlement of Bechuanaland, 1878-81; English Opinions on South

Africa, 1882-83; the Transvaal Struggle for Supremacy in South Africa—the Delegates in England, 1883-84. Book II. The Bechuanaland Protectorate—Incidents and Adventures among the Freebooters, including, Establishment of the Protectorate—Signing the First Treaty; Submission of Stellaland, May 1884; the Treaty signed in West Bechuanaland—A Zig-zag Policy at Downing Street. Book III. Backing Out, including, the Upholding of the Protectorate; Withdrawal of the Imperial Factor from Bechuanaland; the Transvaal Triumphant. Book IV. The Bechuanaland Expedition under Sir Charles Warren. Book V. The Protectorate enlarged by the Imperial Government—Announcement to the Chiefs in North Bechuanaland—Sir Charles Warren visits Shoshong. Book VI. The Imperial Government in South Africa—the Past, the Present, and the Future. The maps are—(Vol. i.) Sketch Map of British Bechuanaland, compiled from the latest sources, May 1887. Scale 1 : 3,672,880. (Vol. ii.) Austral Africa, by W. Shawe, F.R.G.S. Scale 1 : 3,850,000.

Rivoyre, Denis [de].—*Les Français à Obock*. Paris, Dreyfous [1887]. Price 2½ francs. [Presented by the Publisher.]

This is one of a series of volumes dealing with the various French colonies and protectorates. M. De Rivoyre has travelled much about the Red Sea and the Persian Gulf, mainly with a view to advance French commercial interests. He does not write in the most complimentary terms of the English agents whom he met, and whose guest he was; but the book may be accepted as a useful and fairly trustworthy account of Obock and the French connection with the place. It gives a sketch of the events which led to the acquisition of Obock, details as to its geographical position, strategical and commercial value, and the peoples in its vicinity. There are small maps of Obock and of the Red Sea.

Stone, Olivia M.—*Teneriffe and its six Satellites, or the Canary Islands, Past and Present*. London, M. Ward & Co., 1887: two vols., 8vo. Vol. I., pp. xv. and 477; Vol. II., pp. vii. and 459. Price 42s. [Presented by the Publisher.]

A good deal more has been written about the Canary Islands than Mrs. Stone would lead us to infer, though the information is scattered, and most of it, perhaps, rather old. At the same time Mrs. Stone's two volumes will be welcome to many, especially to the increasing class who desire to know the suitability of the islands as winter quarters. Mrs. Stone and her husband spent some months in the islands in 1883-4, visiting several of them, including Hierro, which probably no English people had visited before. Mrs. Stone is a most industrious collector of information; she has not contented herself with what she saw and heard in the islands, but has interwoven her narrative with the results of her reading, so that any one desirous of learning as much as possible about the islands from one work, could scarcely do better than read this. There are numerous illustrations and maps, both good.

AMERICA.

[**Colombia.**]—*Descripcion Historica, Geografica y Politica de la Republica de Colombia*. Edicion Oficial. Bogota, Imp. de "La Luz," 1887: sm. 8vo., pp. 23.

Le Conte, J.—*Flora of the Coast Islands of California, in relation to recent Changes of Physical Geography*. 'American Journal of Science,' December 1887.

Richter, [Dr.] C. M.—*Ocean Currents contiguous to the Coast of California*. 'Bulletin of the Californian Academy of Sciences,' vol. ii., No. 7, 1887.

This is a discussion of the leading data concerning the currents of the North Pacific generally, and those affecting the American coast particularly, the conclusion being that more observations are wanted, as well as a reconsideration of the laws which affect ocean-currents.

[**Yellowstone National Park.**]—*Report of the Superintendent of the Yellowstone National Park to the Secretary of the Interior*. 1887. Washington, Government Printing Office, 1887: 8vo., pp. 28. [Presented by the Marquis of Salisbury.]

ARCTIC.

[**Greenland.**—Meddelelser om Grønland, udgivne af Commissionen for Ledelsen af de Geologiske og Geographiske Undersøgelser i Grønland. Kjøbenhavn, 8vo.; 4de Hefte, pp. 289; 5de Hefte, pp. 232; 6de Hefte, pp. 221 (1883); 3die Hefte, Fortsættelse, pp. xvii.-l. and 233-444; 11te Hefte, pp. 143 (1887); Tillæg til femte Hefte, 4to, pp. 27, and 109 plates (1883). [Presented through Admiral Irminger.]

These volumes complete, so far as published, the Society's set of this very valuable work, which is indispensable to any one desirous of making a thorough study of Greenland. In the fourth volume we find papers dealing with researches on the geology and geography of the west coast of Greenland; the nickeliferous veins of Greenland; geognosey and geography of the explored part of Greenland. Volume v. contains an account of explorations in North Greenland in 1878-80, by K. J. V. Steenstrup; and also notes on the Cretaceous and Miocene Fossil Flora of West Greenland, by the same author. There is also a long paper by the late Dr. O. Heer on the Fossil Flora of Greenland, to which the quarto volume is an appendix. In the sixth volume are accounts of the exploration of the east coast of Greenland, between 60° and 70° N. lat., with special reference to the old Norse remains; and a chapter on the geography and geognosey of the south part of Greenland, with notes on the extension of ice in Davis Strait in the summer of 1881. The continuation of vol. iii. treats of the Flora of Greenland. The volumes are amply supplied with maps and illustrations.

Nordenskiöld, A. E.—Vega-Expeditionens Vetenskapliga Iakttagelser, bearbetade af Deltagare i Resan och andra Forskare utgifna af A. E. Nordenskiöld. Fjerde Bandet, Femte Bandet. Stockholm, F. & G. Beijers, 1887: 8vo., pp. (vol. iv.), 582; (vol. v.), 535; map and plates. [Presented by Baron A. E. Nordenskiöld.]

These two volumes deal principally with the fauna of the region embraced.

AUSTRALASIA.

Daly, [Mrs.] Dominic.—Digging, Squatting, and Pioneering Life in the Northern Territory of South Australia. London, Sampson Low & Co., 1887: 8vo., pp. xi. and 368. Price 12s. [Presented by the Publishers.]

This is a welcome addition to our knowledge of this portion of the Australian Continent. The opening chapter is devoted to the Early History of North Australian colonisation. In the next eighteen chapters Mrs. Daly relates her own experiences in the Northern Territory from 1870 to 1873; the volume concludes with an account of the history and progress of the settlement up to the present time. There are a map and an index adding greatly to the usefulness of the work.

GENERAL.

Annalen des Physikalischen Central-Observatoriums, herausgegeben von H. Wild. Jahrgang 1886. Theil I. Meteorologische und magnetische Beobachtungen von Stationen 1. Ordnung und ausserordentliche Beobachtungen von Stationen 2. und 3. Ordnung. St.-Petersburg, Buchdruckerei der K. Akademie der Wissenschaften, 1887: 4to.

[**Circumnavigation of the Caracciolo.**—Viaggio di Circumnavigazione della Regia Corvetta "Caracciolo" (Commandante C. De Amezaga) negli Anni 1881-82-83-84. Roma, Forzani e Comp., 1885-86: 4 vols. 8vo.; i. pp. 332; ii. pp. 275; iii. pp. 514; iv. pp. 588. Price 2l.

This is a valuable addition to modern scientific voyages of circumnavigation. Starting from Italy, the *Caracciolo* passed through the Strait of Gibraltar and

across the Atlantic to Pernambuco. A considerable time was spent on the coasts of South America, with occasional incursions into the interior. The chief points touched at were Rio Janeiro, Monte Video, Tierra del Fuego, and several places on the west coast as far as the Isthmus of Panama. Much good work was done in the Straits of Magellan, and here, as elsewhere, collections made in all departments of natural history, and observations on the geography, the ethnology, the social and political condition of the various regions visited. From Callao the vessel went right across the Pacific to Sydney, visiting Tahiti and Fiji by the way. The east coast of Australia was visited at various places, and passing through Torres Strait, the expedition spent some time in the Malay Archipelago, going on to Singapore and Ceylon. From Ceylon the *Caracciolo* proceeded to the Seychelles, and up through the Red Sea and Suez Canal, and came to anchor at Venice. The first volume gives a general sketch of the voyage, with detailed observations on certain points. The second is occupied with detailed accounts of Tahiti and Fiji. The third is devoted to Brazil, Uruguay, and Chile; and the fourth to Peru, Panama, Ecuador, Australia, the Malay Archipelago, Ceylon, the Seychelles, Aden, and Assab. There are lists of the collections made in various departments, and an abundant equipment of maps and illustrations.

Darwin, Francis.—The Life and Letters of Charles Darwin, including an Autobiographical Chapter. London, John Murray, 1887: three vols.; i. pp. x. and 395; ii. pp. iv. and 393; iii. pp. iv. and 418. Price 36s.

We need only say here that this long looked-for life of Charles Darwin is in every way worthy of its great subject. It cannot enhance a reputation which could not rank higher; but it will present his character and his work in lights which must be new to those who only knew him from his published writings. Darwin, it will be seen, was as good and noble-minded, and humane, as he was great. The work consists of three leading sections: an autobiography; a sketch of Darwin's everyday life at Down, by Mr. Francis Darwin; and the letters which are connected, when necessary, by a few sentences by Mr. Francis Darwin. Imbedded in this is a chapter of great historical and scientific interest, by Professor Huxley, on the appearance of the 'Origin of Species.' The autobiography shows very clearly and interestingly the growth of Darwin's own mind, and the various influences which affected that growth; just as in the letters may be traced the growth of his great and fruitful scientific conception. It must interest geographers to perceive that more, perhaps, than anything else Darwin's travels over the world with the *Beagle* determined the groove in which his great genius should work; geography, indeed, may be said to have been the basis of all his work. But then he was properly equipped before he set out to take advantage of his exceptional opportunities; and it must be so with every traveller unless he is content to produce a mere itinerary. Darwinism has been fruitful in many directions; and it is only by the steady application of its principles that the new geography will ever reach the stage of a department of science.

Heyes, J. F.—The Recognition of Geography. A reprint of two articles. Oxford, G. Phipps, 1887: 8vo., pp. 8. [Presented by the Author.]

—Aspects of Imperial Federation. Two articles contributed to 'Imperial Federation.' Oxford, G. Phipps, 1887: 8vo., pp. 9. [Presented by the Author.]

Hugues, Luigi.—Guida per L'Insegnamento della Geografia, nelle Scuole Primarie e Secondarie. Parte Prima, La Regione Italiana—Primi Elementi di Geografia Generale. Torino, Ermanno Loescher, 1887[8]. [Presented by the Author.]

Signor Hugues is one of the most prolific writers of geographical text-books in Italy. The present volume seems specially meant for teachers, and if they are well trained to begin with, the hints given ought to prove useful. The author begins with the school, and goes outwards.

Ivestija Imperatorskago Russakago Geographicheskago Obshestva, tom. xxiii., No. 4. Proceedings of the Imperial Russian Geographical Society, pp. 413–572. St. Petersburg, 1887.

This number contains Dr. Junker's report on his seven years' travels in Equatorial Africa (see Proc. R.G.S., vol. ix., No. 7). A sketch on the Kirghiz of the province of Semirétchia, by A. N. Krasnof, in which the author points out some distinctions between the Kara-Kirghiz or Kirghiz proper, and the Kirghiz-Kazaks, the so-called Kirghiz of the Great, Middle, and Lesser Hordes. He describes their occupations; their yurtas or felt tents, which are incomparably cleaner than those of the Kalmucks; their food, and modes of preparing it; their tillage, and the constant development of agriculture among them; their nomadising from the plains to the mountains; their games, horse-racing, their winter encampments, &c., &c. He then speaks of some peculiarities in their character; their impressionableness, vivacity, and so on. In conclusion he touches on the relations of the Kirghiz with their new neighbour in Central Asia—the Russian colonist, peasant or Cossack, emigrant from Great or Little Russia, and on his system of imposing upon the credulous inhabitants of the steppe. On the whole, this sketch is a welcome contribution to our knowledge of a people who are probably more numerous than any other in Russian Turkistan, and are undergoing a process of transformation, as they come more and more in contact with the advance of civilisation.

The next article is entitled "Hearsay Information on Eastern Tibet," by G. N. Potanin, collected by him on his recent journey while visiting the monasteries of Kum-bum, Labrang, and Joni, and in the town of Sung-pang. The chief interest in these lies in the various itineraries through Eastern Tibet to Lhasa. Further hearsay information, collected by the same traveller, relates to the region between the Nan-shan, Khangai, Hami, and Utai-shan. When all these routes have been plotted on the map, it will be found that considerable blanks in the cartography of this part of the world have been filled in, and a real service done to geography. The last short article in this number is on the results of the chronometric expedition in Lapland, accomplished by Captian Ernfeldt, of the Staff Corps, giving fifteen positions astronomically fixed by him in that country.—[E. D. M.]

Martin, [Staff-Commr.] W. R.—A Text-Book of Ocean Meteorology, compiled from the Sailing Directions for the Oceans of the World, by Alex. Geo. Findlay. London, Richard Holmes Laurie, 1887: 8vo., pp. vii. and 242. [Presented by the Publisher.]

This book is the result of a want felt by Commander Martin himself, in connection with his lectures on Ocean Meteorology at the Royal Naval College. He has here brought together in concise form the information scattered through the Admiralty Sailing Directories and Findlay's Directories. As the volume deals with so many points of great interest in physical geography, it ought to be useful to others besides naval students. It deals with all the most important subjects relating to the Ocean in general, and the various oceans in particular. It contains five charts.

[Quaritch's General Catalogue. Part XII.]—Catalogue of Books on the History, Geography, and of the Philology of America, Australasia, Asia, Africa. I. Historical Geography, Voyages, and Travels. II. History, Ethnology, and Philology of America. III. History, Topography, and Ethnology of Asia, Polynesia, and Africa. Offered for cash at the affixed net prices by Bernard Quaritch. London, June 1885 to October 1886. 1886: 8vo. [Presented by Mr. Bernard Quaritch.]

Rosny, Léon de.—Publications de l'École des Langues Orientales vivantes. Kami Yo-No Maki. Histoire des Dynasties Divines, publiée en Japonais, traduite pour la première fois sur le Texte Original, accompagnée d'une Glose inédite composée en Chinois, et d'un Commentaire perpétuel rédigé en Français par Léon de Rosny.

II. *Le Règne du Soleil*. III. *L'Exil*. Paris, Ernest Leroux, 1887: large 8vo. [Presented by the French Minister of Public Instruction.]

Vassili Verestchagin—Painter, Soldier, Traveller. Autobiographical sketches translated from the German and the French, by F. K. Peters, M.A. London, Bentley & Son, 1887: 2 vols., cr. 8vo.; vol. i., pp. xii. and 336; vol. ii., pp. 350. Price 24s.

In these volumes the well-known Russian painter gives us some reminiscences of his adventurous life. The most interesting chapters are those in which he speaks of Skobelev's winter march over the Balkans, and the brilliant operations crowned by the surrender of Vessel Pasha's army. There are some interesting personal traits of Skobelev and Turguénief, with both of whom the author was on terms of intimacy, and two or three characteristic sketches of the inconvenience of travelling in Russia and Siberia. The art-tours in Trans-Caucasia, Central Asia, and India—the last by Madame Verestchagin—are full of incident and novelty, and the whole book is written in an easy style, suited to the general reader. We may add that the illustrations, by the author's own pencil, are both numerous and excellent.—[E. D. M.]

The following work has also been added to the library:—

Lüdde, Johann Gottfried.—*Die Geschichte der Methodologie der Erdkunde*. In ihrer ersten Grundlage, vermittelt einer historisch-kritischen Zusammenstellung der Literatur der Methodologie der Erdkunde. Leipzig, J. C. Hinricks, 1849: 8vo., pp. xiv. and 130.

NEW MAPS.

(By J. COLES, *Map Curator* R.G.S.)

WORLD.

Gaebler, Ed.—Wandkarte der oestlichen Erdhälfte. Scale 1:24,000,000, or 328 geographical miles to an inch. 4 sheets. Leipzig, Neustadt. Price 11s. (*Dulau*.)

— Wandkarte der westlichen Erdhälfte. Scale 1:24,000,000, or 328 geographical miles to an inch. 4 sheets. Leipzig, Neustadt. Price 11s. (*Dulau*.)

World.—Linien Gleicher Wärmeanomalie des Jahres. (Thermische Isanomalien.) Petermann's 'Geographische Mitteilungen,' Jahrgang 1887, Tafel 20. Gotha, Justus Perthes. (*Dulau*.)

EUROPE.

France.—Carte de —, dressé par le Service Vicinal par ordre de M. le Ministre de l'Intérieur. Scale 1:100,000, or 1·3 geographical miles to an inch. Paris, 1887. Sheets: II.—16, Plogoff; IV.—14, Morlaix; IX.—12, Coutances; IX.—13, Granville; XI.—28, Blaye; XVII.—7, Arras; XXII.—25, Lyon (Nord-Est); XXII.—33, Cavaillon; XXII.—34, Salon; XXIII.—36, La Ciotat; XXVI.—20, Damprihard; XXVI.—34, Nice; XXVI.—35, Cap Roux; XXVII.—34, Monaco. Hachette et Cie., Paris. Price 7s. each sheet. (*Dulau*.)

Korfu.—Originalkarte der Insel —. Auf Grund der Englischen Aufnahme und nach eigenen Untersuchungen entworfen u. gezeichnet von Prof. Dr. J. Partsch. Scale 1:100,000, or 1·3 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Ergänzungsheft No. 88. Gotha, Justus Perthes, 1887. (*Dulau*.)

Riviere Liguri e delle Alpi Marittime.—Carta Geologica della —, di A. Iss L. Mazzuoli e B. Zuccagna, Soci del Club Alpino Italiano. Scale 1:200,000, 2·7 geographical miles to an inch. Pubblicazione fatta per cura del Club Alpino Italiano (Sezione Ligure), 1887. (*Dulau.*)

In this map, which is based on Government surveys, the colouring has been very well chosen, and indicates clearly the different geological formation. Three vertical geological sections of the Maritime Alps are given, together with notes explanatory of the system of colouring adopted, and the authorities used in the compilation of the maps.

Russia.—Politische Schul-Wandkarten der Länder Europa's, bearbeitet von Richard Kiepert. Russland. Scale 1:3,000,000, or 41·6 geographical miles to an inch. Berlin, Dietrich Reimer, 1887. (*Dulau.*)

Sweden.—Sveriges Geologiska Undersökning. Scale 1:50,000, or 1·4 inches to a geographical mile. Ser. Aa, No. 92, Bladet "Lund." No. 94, Bladet "Norrtelge." No. 97, Bladet "Svartklubben." No. 98 & 99, Bladet "Forsmark." No. 101, Bladet "Oregrund." No. 102, "Motala."—Scale 1:200,000, or 2·7 geographical miles to an inch. Ser. Ab, No. 11, Bladet "Venersborg," Bladet "Halmstad." (*Dulau.*)

ORDNANCE SURVEY MAPS.

Publications issued during the month of November 1887.

6-inch—County Maps:—

ENGLAND AND WALES: **Brecknockshire:** 38 S.W., 40 S.E., 41 N.E., 46 N.E.; 1s. each. **Cambridgeshire:** 14 S.W., 16 N.W., containing March, 27 N.E., S.W., 28 N.E., 34 N.W.; 1s. each. **Carmarthenshire:** 9 S.E., 46 N.W., N.E.; 1s. each. **Cornwall:** 19 S.W., 69 S.W.; 1s. each. **Derbyshire:** 48 N.E.; 1s. (Derbyshire is now completed on the 6-inch scale on 222 quarter sheets at 1s. each.) **Devonshire:** 101 N.E., 109 S.W.; 1s. each. **Dorsetshire:** 23 N.E., S.E., 26 N.E., 32 N.E., S.E., 34 S.W.; 1s. each. **Gloucestershire:** 62 S.W., 75 N.E., 76 N.W., S.E.; 1s. each. **Herefordshire:** 39 N.E., 44 S.W., 46 S.W., 50 S.E., 52 N.W., 54 N.W.; 1s. each. **Huntingdonshire:** 5 N.E., S.E., 6 S.W., 12 S.W., S.E., 14 N.E., S.E., 15 S.W. (16 N.W. and 16A N.E. on one sheet), 19 N.E., 25 N.W.; 1s. each. **Lincolnshire:** 14 S.E., 39 N.W., S.E., 64 N.W., 74 S.W., 82 N.W., S.W., 90 N.E., S.E., 103 N.E., 104 N.W., 131 N.W., N.E., 134 N.W., S.E., 137 S.W., 144 S.W., 144A N.W.; 1s. each. **Merionethshire:** 13 S.W., S.E., 21 S.W., S.E., 1s. each. **Montgomeryshire:** 19 S.W.; 1s. **Norfolk:** 87 N.E., 101 N.E.; 1s. each. **Shropshire:** 31 S.W., 33 S.E., 35 N.E., S.W., 36 S.W., containing Wellington, 40 N.E., 42 N.W.; 1s. each. **Somersetshire:** 47 N.E., 58 N.E., 60 S.E., 71 N.E., 79 N.E.; 1s. each. **Staffordshire:** 4 S.E., 7 N.E., 8 N.E., 70 N.E., 72 N.W., S.W., 74 N.E.; 1s. each. **Suffolk:** 11 N.E., S.W., 69 S.W., 88 N.W.; 1s. each. **Warwickshire:** 8 N.E., 10 N.W.; 1s. each. **Worcestershire:** 5 N.W., S.W., 8 N.E.; 1s. each.

25-inch—Parish Maps:—

ENGLAND AND WALES: **Cambridgeshire:** XI. 4, 4s.; XIII. 5, 5s.; XIII. 13, XV. 5, 4s. each; XV. 12, 3s.; XVI. 3, 14, 16, XVII. 6, XVIII. 13, 4s. each; XXI. 10, 13, 3s. each; XXII. 3, 4, 6, 13, 4s. each; XXII. 15, 5s.; XXIII. 1, 5, 13, XXVI. 6, 4s. each; XLV. 15, 3s.; XLVI. 7, 4s.; XLVI. 10, 15, LI. 7, 3s. each; LIII. 12, 4s. **Cardiganshire:** VII. 10, 12, 15, XI. 3, 4, 7, 8, 3s. each. **Carmarthenshire:** XXXIII. 4, 8, 13, 3s. each; XXXIII. 14, 4s.; XLI. 5, 6, 10, 13, 14, XLIII. 1, 3s. each. **Devonshire:** CXIV. 16, 4s.; CXIX. 13, CXXV. 9, 10, 3s. each; CXXVI. 4, 4s.; CXXVI. 8, 3s. **Dorsetshire:** I. 11, II. 13, III. 3, 7, 3s. each; III. 8, 5s.; IV. 1, 2, 3s. each; IV. 5, 4s.; IV. 9, 10, 13, 3s. each; IV. 14, 5s.; IV. 15, 3s.; VII. 4, 4s.; VII. 7, 8, 3s. each; VII. 9, 10, 4s. each; VII. 11, 12, 13, 14, 3s. each; VII. 15, 4s.; VII. 16, VIII. 2, 5, 6, 7, 10, 11, 13, 3s. each; VIII. 14, 4s.; VIII. 15, 16, XA. 16, XI. 13, XII. 11, XIII. 9, 16, 3s. each; XIV. 2, 4s.; XIV. 3, 6, 7, XIX. 7, 3s. each. **Gloucestershire:** XXVI. 3, 6s. 6d. **Herefordshire:** XII. 15, 6s. 6d.; XXVIII. 15, 3s.; XXIX. 9, 4s.; XXXI. 15, XXXII. 1, 3s. each; XXXII. 10, 11, 4s. each; XXXII. 16, 3s.; XXXIII. 13, 4s.; XXXIII. 14, 3s.; XXXVI. 6, 4s.; XXXVI. 9, 3s. **Huntingdonshire:** XX. 1 and 2 on one sheet, XXIV. 8, 3s. each. **Leicestershire:** XLVIII. 3, 16, 3s. each. **Lincolnshire:** VII. 7, 4s.; VII. 9, 5s.; VII. 12, 4s.; VII. 15, 16, VIII. 5, 14, XII. 5, 7, 8, LIV. 1, 2, 8, 11, 12, 3s. each; LIV. 13, 4s.; LIV. 14, 15, LXXII. 1, 3s. each. **Merionethshire:** XV. 6, 6s. each. **Montgomeryshire:** XI. 5, 4s. **Norfolk:** IV. 15, 4s.; XXXII. 5, 3s.; XXXII. 11, 5s.; XXXII. 13, XXXIII. 6, 9, 4s. each; XXXIII. 14, LXXVIII. 5, 5s. each; LXXVIII. 13, 16, LXXX. 4, 6, 8, 9, LXXXI. 13, XCI. 1, 2, 5, 4s. each. **Nottinghamshire:** XIII. 2, 4s. **Somersetshire:** XVI. 4, XLIII. 5, LXXII. 1, 4s. each; LXXII. 13, 3s.; LXXII. 3, 4s. each; LXXAI. 4, 5s.; LXXAI. 6, 3s.; LXXAI. 9, 14, 15, LXXXII. 15, 4s. each; LXXXVIII. 2, 3, 3s. each; LXXXVIII. 5, 8, LXXXIX. 10, 4s. each; LXXXIX. 12, 15, 16, XC. 13, XCII. 2, 3, 5, 6, 3s. each. **Warwickshire:** XXIII. 13, 4s.; XXXI. 11, XXXIV. 1, 6, 3s. each. **Wiltshire:** LI. 1 and 2 on one sheet, 4, 6, 9, 12, LVIII. 7, 11, 13, 15, LIX. 1, 9, 13, 14, 3s. each; LXIII. 5, 6, 4s. each; LXIII. 12, 16, LXIV. 1, 3, 4, 5, 8, 9, 11, 14, LXV. 1, 2, 6, 9, 15, LXIX. 1, 2, 3, 4, 5, 9, 12, 15, 16, LXX. 1, 2, 4, 6, 9, 11, 12, LXXIV. 2, 6, 7, 10, 3s. each. **Worcestershire:** XXIV. 11, 3s.

Town Plans—10-feet scale:—

ENGLAND AND WALES: **Bridgewater,** L. 10, 9, 25; L. 11, 11, 16; L. 14, 5; L. 15, 1, 2, 6, 7, 8, 11, 2s. each. **Hinckley,** XLII. 4, 21, 22; 2s. each. **Leicester,** XXXI. 14, 15; 2s. each. **Nuneaton,** XI. 9, 17, 19; 2s. each. **Rusby,** XXVIII. 2, 25; XXVIII. 3, 11, 12, 13, 14, 16, 18, 19, 21, 22, 24; XXVIII. 6, 5, 10; XXVIII. 7, 1, 2, 3, 6, 7, 8, 11; 2s. each. **Warminster,** LI. 8, 8, 11, 12, 13, 14, 16, 17, 18, 19, 21, 22, 23; 2s. each.

(*Stanford, Agent.*)

115°

MAP OF BRITISH NORTH B

Compiled from the Admiralty Charts
Surveys and Explorations

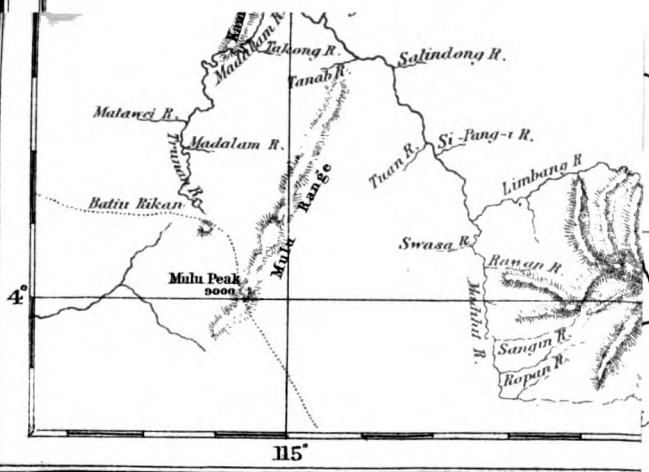
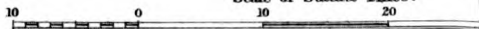
Messrs F. X. Witt, W. B. Pryer, F. Hatton, H. J.

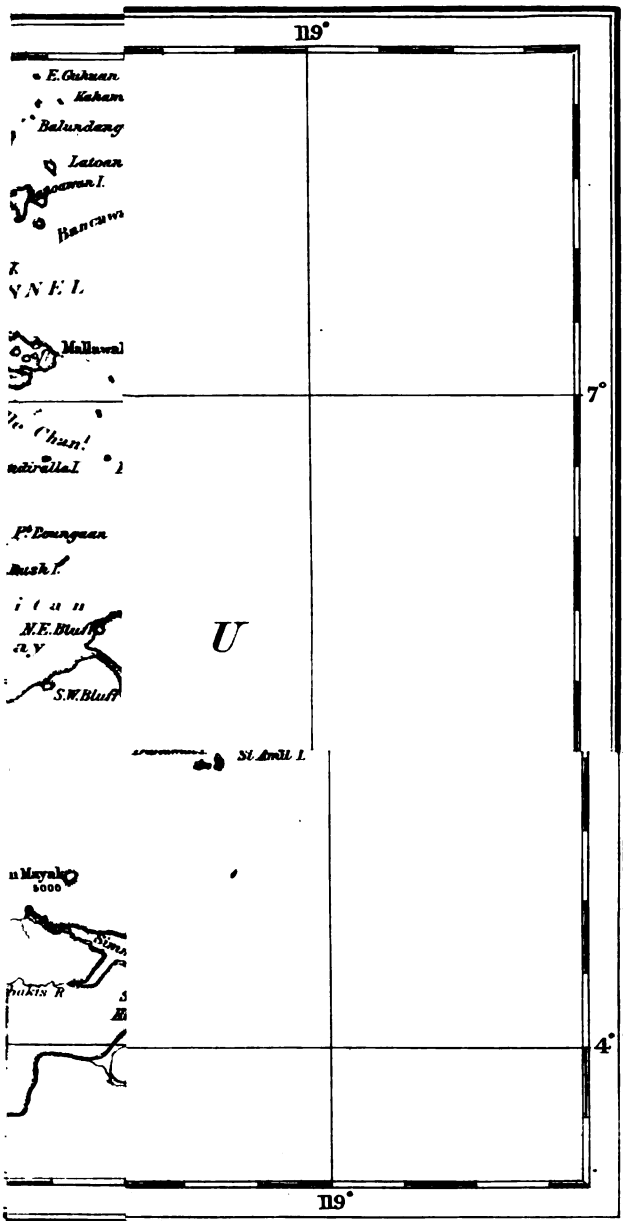
To illustrate the Paper of Mr Dal

Explanations.

Bandar	Town	Kuala
Batu	Rock	Labuan
Besar	Large	Merah
Bukit, Bod	Hill	Pulo
Danau	Lake	Sungei
Gunong	Mountain	Tanjong
Kampong	Village	Telok
Ketchil	Small	Trusan

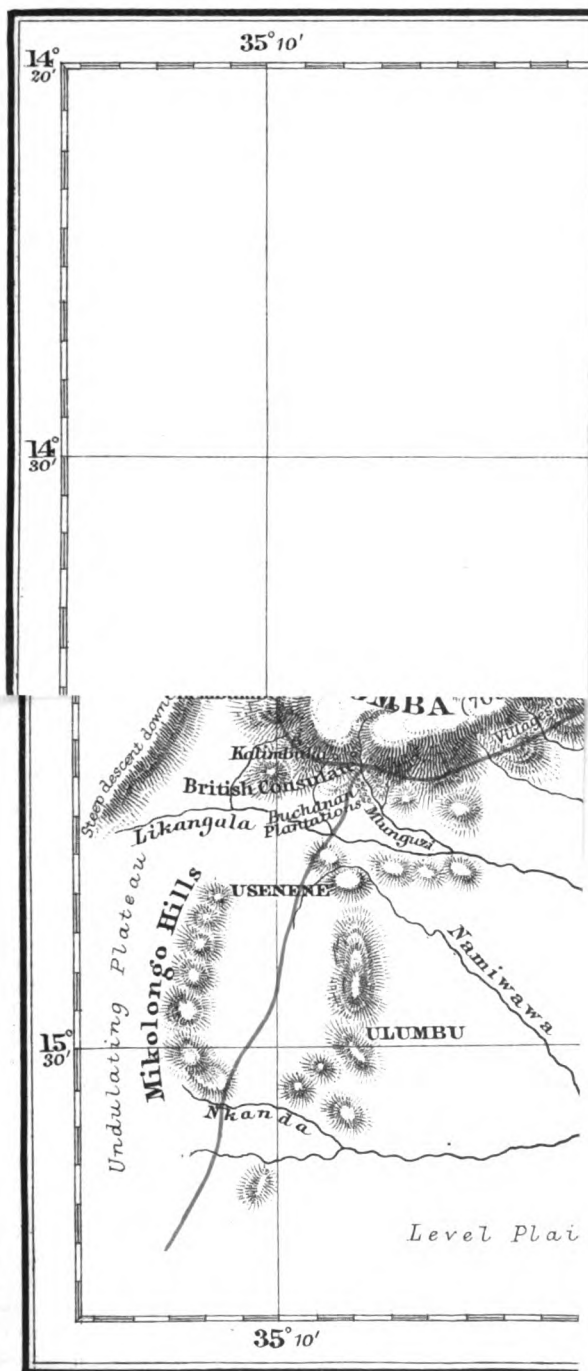
Scale of Statute Miles.





1888.

W. & A. E. Johnston.



3

36°

36° 10'

14°
20're **Namaramba**re Houses and Storehouses
built on piles in the Lake.14°
30'

sh

ND NEIGHBOURHOOD

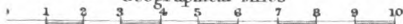
BY

— ALEXANDER HETHERWICK M.A.

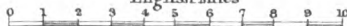
Church of Scotland Mission.

EAST AFRICA.

Geographical Miles



English Miles

— Altitudes less than 1000 ft are reckoned
from level of plain or lake.Stations where latitude observations
were taken are underlined in red.

Author's Route

36°

36° 10'

15°
30'Edw^d Weller

ASIA.

Indian Government Surveys:—

India, showing Density of Population. Scale 80 miles to an inch, 1887.—Indian Atlas. 4 miles to an inch. Sheets: 15 S.W. Parts of Districts Bannu, Dera Ismail Khan, Shahpur and Kohat (Punjab); 18 S.E. Parts of Bickaneer and Jeysulmere (Rajputana Agency), and of Bahawalpur Native State (Punjab); 28, Parts of Districts Hazara and Rawalpindi (Punjab) and of Native State, Kashmir; 32 S.E. Portions of Jeypore, Bickaneer, and Loharu Native States (Shikhawati subordinate to Jeypore); 32 N.E. Parts of District Hissar and Loharu Native State (Punjab), and State of Bickaneer (Rajputana); 49 N.E. Parts of Districts Moradabad, Meerut, Muzaffarnagar and Bijnor (N.W. Provinces), Delhi and Karnal (Punjab); 49 S.E. Parts of Districts Gurgaon and Delhi (Punjab), Meerut, Bulandshahr, Muttra, Aligarh and Moradabad (N.W. Provinces); 50 N.E. Parts of Districts Agra, Muttra and Aligarh (N.W. Provinces), Gurgaon (Punjab), and Burtpore and Ulwur (Native States Rajputana Agency); 50, Bhurtpoor (Native State), and Parts of Districts Goorgaon, Allygurb, Muthra, Agra and the Native States of Gwalior, Jeypore, Ulwur, Dholpur and Kerowlie.—Bombay Survey, 1 inch to a mile, sheet No. 135, District Thana and Jawhar State. Season 1884–85. No. 136, District Thana, Season 1881–82. No. 141, Habsan State, 1884–85. No. 161, Districts Thana, Nasik and Jawhar State. Seasons 1873–74 and 1883–84. No. 169, Districts Kolaba, Ratnagiri and Habsan State. Season 1884–85. No. 171, District Ratnagiri. Season 1884–85. No. 203, Districts Satara and Ratnagiri. Seasons 1883–84–85. No. 238, Districts Satara, Kolhapur and Southern Maratha Agency. Season 1883–84. No. 270, Districts Sholapur, Satara, Kolhapur and Southern Maratha Agency. Season 1883–84.—Punjab Survey. 1 inch to a mile. Sheet No. 243, District Hissar and Bickaneer State. Seasons 1867–68, 1876–78, and 1883–84. No. 244, District Hissar and Bickaneer State. Seasons 1867–68, 76–77, and 82–83. No. 257, District Hissar and Patiala State. Seasons 1847–48 and 1882–84. No. 258, District Hissar and Patiala State. Season 1882–84.—Cutch Survey. 1 inch to a mile. Sheet No. 69, Parts of Thar Parkar, North Gujarat and Ran of Cutch. Season 1885–86. Reduction of sheets 17, 18, 24, and 25 of Cutch. 2 miles to an inch. Seasons 1881–82 and 1883–84.—North-West Provinces Survey. 1 inch to a mile. Sheet No. 208 (Preliminary edition), District Ballia. Seasons 1874–76. No. 209, Districts Ghazipur and Ballia. Seasons 1874–76 and 1880–82. No. 217 (Preliminary edition), Districts Ballia and Saran. Seasons 1875–76 and 1881–83.—Central India and Rajputana. 1 inch to a mile. Sheet No. 401, Parts of Districts Jalaun and Jhansi, and of Gwalior and Dattia (Native States). Seasons 1853–56 and 1862–63.—Hyderabad Survey. 2 miles to an inch. Sheets Nos. 104 and 105 (on one), Yedageery Circar. Season 1824–25. Nos. 201, 202, 203, 212, and 213 (on one); 204, 205, 214, 215, and 222 (on one); 208, 209, 216, and 217 (on one); 224, 210, 211, 218, 219, 220, 221, 223, 225, Kummumett Circar. Seasons 1823–38.—Assam Survey. 1 inch to a mile. Sheets Nos. 57, 68, 69, 70, 80, 81 (Preliminary editions), District Cachar. Seasons 1878–83.—Oudh Revenue Survey. 1 inch to a mile. Sheet No. 86, District Hardoi. Seasons 1864–86. No. 87, District Hardoi. Seasons 1864–66. No. 104, Districts Hardoi and Unao. Seasons 1863–66. No. 118, Districts Sitapur and Hardoi. Seasons 1863–65. No. 119, Districts Lucknow, Unao, Bara Banki, Sitapur and Hardoi. No. 122, Districts Rae-Bareilly and Unao. Seasons 1860–62. No. 134, Districts Lucknow, Bara Banki and Sitapur. Seasons 1862–64 and 1865–66.—Mysore Topographical Survey. 1 inch to a mile. Sheets Nos. 26, 49, 54, 58, 62, 67, 68, 69, Parts of

Mysore and Kadur Districts. Seasons 1879-85.—Burma Survey. 1 inch to a mile. Sheet No. 179, District Prome. Season 1882-83.—Lower Burma Survey. 1 inch to a mile. Sheet No. 140, District Bassein. Season 1882-85. No. 182, District Henzada. Season 1884-5.—Upper Burma, Preliminary Map, 1886. 16 miles to an inch.—Skeleton Map of the Punjab and surrounding countries, 1874. 32 miles to an inch. With additions to December 1886.—The Rajputana Agency. 16 miles to an inch, 1887. 2 sheets.—District Hoshangabad. 4 miles to an inch, 1887.—District Peshawar under the jurisdiction of the Lieut.-Governor of the Punjab. 4 miles to an inch, 1885.—Map of the Presidency Division comprising the Districts of Moorsheadabad, Nuddea, Jessore, Khoolna, and 24-Pergunnahs, with Sundarbans, 1886. 8 miles to an inch. 1st edition.—District Bannu, under the jurisdiction of the Lieut.-Governor of the Punjab. Seasons 1874-79. 4 miles to an inch.—Skeleton Map of the Afghanistan and Punjab Frontier. 32 miles to an inch, 1886.—Skeleton Map of the Burma and Assam Frontier. 32 miles to an inch, 1886.—Skeleton Map of the Baluchistan and Sind Frontier. 32 miles to an inch, 1886.—Punjab: Maps of the following Districts:—Montgomery, 8 miles to an inch, 1887; Muzaffargarh, 16 miles to an inch, 1887; Jhelum, 8 miles to an inch, 1887.—North-West Provinces and Oudh: Maps of the following Districts:—Tarai, Shahjahanpur, Saharanpur, Rae-Bareilly, Pilibhit, Jalaun, Hamirpur, Gonda, Garhwal, Bijnor, Bulandshahr, Basti, Benares, Bareilly, Banda, 8 miles to an inch, 1887.—Central Provinces: Maps of the following Districts:—Raipur, 16 miles to an inch; Narsinghpur, Nimar, Nagpur, Damoh, Chhindwara, Bhandara, Betul, Balaghat, 8 miles to an inch, 1887.—Bengal: Maps of the following Districts:—Mozuffarpore (Tirhoot), Udaipur (Tributary State of Chota Nagpore), Sonthal Parganas, Singhbhum, Sirguja (Tributary State of Chota Nagpore), Shahabad, Rajshahi, Pubna, Pooree, Noakholly, Morbhaoj (Tributary State of Orissa), Monghyr, 8 miles to an inch, 1887; Midnapore, 12 miles to an inch; Malda, 8 miles to an inch; Loharduggar, 16 miles to an inch; Koria (Tributary State of Chota Nagpore), Howrah, Gya, Furreedpore, Dinagore, Cuttack, Chang Bhakhar (Tributary State of Chota Nagpore), Burdwan, Beerbhoom, Bonai (Tributary State of Chota Nagpore), Bogra, 8 miles to an inch, 1887.

Russisch-Afghanischen Grenzgebiete.—Nach den unter Major T. H. Holdich, R.E., ausgeführten Aufnahmen der Englisch-Russischen Grenzkommission. Reduziert von dem Massstab 1: 250,000 auf den Massstab 1: 1,250,000, or 17·1 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1887, Taf. 18. (*Dulau.*)

AFRICA.

Massaua, Keren, Aksum e Adigrat.—Carta dimostrativa della regione compresa fra —. Scale 1: 400,000, or 5·5 geographical miles to an inch. Istituto Geografico Militare. Firenze, 1887. (*Dulau.*)

— Carta dimostrativa della regione compresa fra —. Scale 1: 250,000, or 3·4 geographical miles to an inch. Istituto Geografico Militare. Firenze, 1887. (*Dulau.*)

In the compilation of these maps all the latest and most reliable authorities have been consulted, the consequence being that far more topographical detail is given than has ever before appeared in any map of the included district. All routes are laid down, and numerous heights given in metres. The maps are cleverly drawn, and the hill-shading is very effective.

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in September and October 1887.

No.		Inches.	
155	m =	4·8	Italy, west coast :—Gulf of Spezia. 2s. 6d.
1004	m =	1·0	Mediterranean :—Western part of Sea of Marmara, with a portion of the Gulf of Teros. 2s. 6d.
2492	m =	0·1	North America, east coast :—Bay of Fundy to Block Island. 2s. 6d.
1013	d =	1·35	Africa, east coast :—Cape Lopez to Cape of Good Hope. 3s.
1032	m =	0·5	Africa, east coast :—Channels between Ras Tikwiri and Mafia Island. 1s. 6d.
166	m =	5·0	China, river Min :—Pagoda anchorage and approaches. 1s. 6d.
1102	m =	1·5	Australia, east coast :—Cleveland bay. 2s. 6d.
1376	m =	various	South Pacific, Galapagos Islands :—Wreck bay to Stephens bay; Approaches to Wreck bay; Sappho cove; Gardner bay; Tagus cove; Post Office bay. 2s.
282	St. Geneviève bay to Orange bay :—Plan added, La Source bay.		
5	Sokotra Island :—Plans added, Tamrida or Hadibo bay; Ghubbet Kallansiya.		
941A	Eastern Archipelago :—Plan added, Flying Fish cove.		
1375	Galapagos Islands :—Plan added, Webb cove.		

(*J. D. Potter, Agent.*)

CHARTS CANCELLED.

No.		Cancelled by	No.
155	Gulf of Spezia	New plan, Gulf of Spezia	155
2417	Gulf of Xeros, eastern part ..	New plan, western part of Sea of Marmara	1004
2492	Bay of Fundy to Block island ..	New chart, bay of Fundy to Block island	2492
1375	Plans on this chart, Post Office bay; Gardner bay; Wreck bay; Tagus cove	New plans on	1376
941A	Plan of Sunda strait, removed.		

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 2450. England, south coast :—Portland to Owers. 2045. England, south coast :—Owers to Christchurch. 2050. England, south coast :—Spithead and approach from the eastward. 30. England, south coast :—Plymouth sound and Hamoaze. 124. North Sea :—Texel. 1126. Mediterranean :—Plans in Corsica. 2687. Cape Breton Island :—Little Bras d'Or lake and St. Anne and Sydney harbours. 2758. Cape Breton Island :—Bras d'Or lake. 2342. Nova Scotia :—Gut of Canso. 331. North America, east coast :—Warsaw, Ossabaw, St. Catherine's and Sapelo sounds. 761. West Indies :—Sheet 1, Florida strait, Bahama islands, and the Greater Antilles. 762. West Indies :—Sheet 2, The Lesser Antilles, and coasts of Venezuela and New Granada. 2860. North America, east coast :—Savannah river to St. Helena sound. 2831. Gulf of Mexico :—Galveston bay. 1801. South America, north coast :—Trinidad to

Surinam. 899. North America, west coast:—San Diego bay to Conception point. 597. Africa, east coast:—Delagoa bay to cape Guardafui. 748a. Indian ocean:—Sheet 1, Southern portion. 51. Hindustan, west coast:—Cambay gulf. 829. Bay of Bengal:—Cocanada to Bassein river. 71a. Bay of Bengal:—Coromandel coast, sheet 1: From lat. $16^{\circ} 30'$ to lat. $18^{\circ} 5'$. 71b. Bay of Bengal:—Coromandel coast, sheet 2: From lat. $15^{\circ} 0'$ to lat. $16^{\circ} 30'$. 71c. Bay of Bengal:—Coromandel coast, sheet 3: From lat. $13^{\circ} 0'$ to lat. $15^{\circ} 0'$. 859. Bay of Bengal:—Mutlah river to Elephant point. 814. Bay of Bengal:—The Sandheads, False point to Mutlah river. 821. Bay of Bengal:—Elephant point to Cheduba strait. 822. Bay of Bengal:—Cheduba strait to Coronge island. 824. Bay of Bengal:—White point to Mergin. 1480. China, north-east coast:—Yang-tse-Kiang, from the sea to Nanking. 2809. China, north-east coast:—Shanghai to Nanking. 532. Japan:—Simonoseki strait. 1079. Tasmania. 1380. Pacific ocean:—New Caledonia, New Hebrides and Loyalty islands.

(*J. D. Potter, Agent.*)

United States Charts.—No. 1037. Gulf of Dulce, West Coast of Costa Rica. No. 1s. 10d. Pilot Chart of the North Atlantic Ocean. December 1887. Published at the Hydrographic Office, Navy Department, Washington, D.C., J. R. Bartlett, Commander, U.S.N., Hydrographer to the Bureau of Navigation.

ATLASES.

Andree, Richard.—Allgemeiner Handatlas in hundertzwanzig Kartenseiten und zwei Ergänzungskarten, nebst alphabetischem Namenverzeichnis. Herausgegeben von der Geographischen Anstalt von Velhagen & Klasing in Leipzig. Zweite Auflage, wesentlich verbesserte und um ein Viertel des Umfanges vermehrte. Bielefeld und Leipzig, Verlag von Velhagen & Klasing, 1887. Price 11. 8s. (*Dulau.*)

As each part of the first edition of this atlas, and its supplements, were published, they were noticed in the Society's 'Proceedings,' and attention was directed to the excellence of the maps; but as seven years have now elapsed since the first part was issued, the author has found it necessary to bring out a second edition, which has evidently received careful attention in the revision, corrections, and additions. There is, however, a matter to which the attention of the author should be directed, and that is the absence of any separate maps of British North America or New Zealand, which, considering the great commercial importance of these two countries, must be regarded as a serious omission, and is the more to be regretted as there is no want of reliable material at hand from which to compile the maps. Taken as a whole, this is the most perfect atlas of its class that has been published. The maps are beautifully drawn, and, what is more important, are accurate. It is furnished with a comprehensive index, which greatly increases its value for general reference.

World.—Handy Reference Atlas of the —, by John Bartholomew, F.R.G.S. With Complete Index and Geographical Statistics. London, John Walker & Co., 1887. Price 7s. 6d., bound in cloth; 10s. 6d. in full Persian morocco.

The aim of the publishers has been to furnish an atlas which for all general purposes is sufficiently complete and reliable, and which, from its size, will be more handy for reference than the larger and more unwieldy works. Several attempts have been made of late by others in the same direction; but, in those instances which have come under our notice, the work of reduction has been carried somewhat too far, and has necessitated the production of maps on a very small scale. In the present atlas, however, the maps are of a useful size, and, being clearly drawn, and not overcrowded with names, are well suited to the purpose for which they have been published. In addition to the maps there is a large amount of statistical information, and a copious index.

ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by Colonel H. H. GODWIN-AUSTEN, F.R.S., J. K. LAUGHTON, M.A., and DOUGLAS W. FRESHFIELD, M.A. Contents: Hints on Surveying and Astronomical Observations. John Coles, F.R.A.S.—Meteorology. R. Strachan, F.M.S.—Geology. W. T. Blanford, F.R.S.—Natural History. H. W. Bates, F.R.S., Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.—Anthropology. E. B. Tylor, D.C.L., F.R.S.—Photography. W. F. Donkin, M.A.—Medical Hints. G. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department.—General Outfit. Colonel J. A. Grant, C.B., Edward Whyteker, and others. Price, in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, W.; and to be had of Edward Stanford, 55, Charing Cross, S.W.

Instruction for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. Surveying and Mapping, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. Geology, including practical training in the field. By Mr. W. Topley, of the Geological Survey; President of the Geologists' Association. 3. Botany. By Mr. N. E. Brown, of the Herbarium, Kew. 4. Photography. By Mr. John Thomson, Author of 'Photographic Illustrations of China and its People,' and other works.

The lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2s. 6d.

Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers, Vol. I. Part 4.—CONTENTS:—1. Geographical Education.—Report to the Council of the Royal Geographical Society. By J. SCOTT KELTIE, Esq. 2. The Cadastral Survey of India. By Lieut.-Col. BARRON (Beng. Staff Corps). 3. Spirit Levelling Operations of the Great Trigonometrical Survey of India. By Major A. W. BAIRD, R.E., F.R.S. 4. Some Remarks on Clinometrical, or Approximate Heights. By Major J. HILL, R.E. 5. Index to Vol. I.

Supplementary Papers, Vol. II. Part 1.—Now Ready.—CONTENTS:—1. Exploration in Southern and South-Western China. By ARCHIBALD R. COLQUHOUN. 2. Bibliography and Cartography of Hispaniola. By H. LING ROTH. 3. Explorations in Zanzibar Dominions. By Lieut. CHAS. STEWART SMITH, R.N.

SAMPSON LOW, MARSTON & CO.'S NEW BOOKS.

NOW READY.

2 vols., demy 8vo, cloth extra, 36s.

RICHARD F. BURTON, K.C.M.G.: HIS EARLY, PRIVATE, AND PUBLIC LIFE. With an Account of his Travels and Explorations, gathered from more than 80 Volumes of his own Works, and other sources. By FRANCIS HITCHMAN, Author of 'The Public Life of the Earl of Beaconsfield,' &c.

NEW AND IMPORTANT WORK ON ENGLISH ADMINISTRATION IN SOUTH AFRICA.

AUSTRAL AFRICA: LOSING IT OR RULING IT: being Incidents and Experiences in Bechuanaland, Cape Colony, and England. By JOHN MACKENZIE. 2 vols. demy 8vo, with Maps and numerous Illustrations, price 32s.

"Mr. Mackenzie's 'Austral Africa' is a work of great value, and indeed of political interest. . . . It is the production of a man of close observation, of strong common sense, and with definite ideas of what ought to be our policy in regard to Africa. The book is handsomely illustrated."—*Scotsman*.

PEN AND PENCIL IN ASIA MINOR: or, Notes from the Levant. By WILLIAM COCHRAN, Member of the Society of Arts, the Highland and Agricultural Society, London and Edinburgh, and formerly of the Asiatic Society, London and Shanghai. Illustrated with 89 Engravings, made chiefly from Water-Colour Sketches by the Author. Demy 8vo, cloth extra, 21s.

DIGGING, SQUATTING, AND PIONEERING LIFE IN THE NORTHERN TERRITORY OF SOUTH AUSTRALIA. By Mrs. DOMINIC DALY. 1 vol. demy 8vo, cloth, 12s.

WILLIAM I. AND THE GERMAN EMPIRE. A Biographical and Historical Sketch. By G. BARNETT SMITH. Demy 8vo, cloth extra, 14s.

NEW WORK BY THE LATE E. B. WASHBURNE, LL.D.
RECOLLECTIONS OF A MINISTER TO FRANCE: THE EMPIRE, THE FRANCO-GERMAN WAR, THE COMMUNE, AND THE REPUBLIC. 2 vols. royal 8vo, with 16 Full-page Illustrations, 36s.

THE CORSAIRS OF FRANCE. By C. B. NORMAN (late 90th Light Infantry), Author of 'Tonkin, or, France in the Far East,' &c. With Portraits and Maps. One vol. demy 8vo, cloth, 18s.

"We cordially commend to every Englishman a careful study of Mr. Norman's facts and figures."—*Galignani's Messenger*.

"Captain Norman has broken new ground in this series of picturesque biographies, and has furnished the lovers of romance and adventure on the high seas with some very entertaining reading. Captain Norman's avowed object in publishing these memoirs is indeed to arouse his countrymen to a sense of our far greater relative deficiencies in these days, and his appendices furnish valuable papers and statistics to this end; but this grave purpose happily does not detract from the readable qualities of his book."—*Daily News*.

THE BOY TRAVELLERS ON THE CONGO. Adventures of Two Youths in a Journey with Henry M. Stanley "through the Dark Continent." By Colonel THOMAS W. KNOX, Author of 'The Young Nimrods,' 'The Voyages of the Vivian,' &c. Demy 8vo, cloth extra, numerous Illustrations, 7s. 6d.

CHINA: its Social Life. By M. SIMON. Crown 8vo, cloth, 6s.

THROUGH THE WEST INDIES. By Mrs. GRANVILLE LAYARD. Small post 8vo, 2s. 6d.

London: Sampson Low, Marston, Searle, & Rivington, St. Dunstan's House, Fetter Lane, Fleet Street.

SCHOOL-SHIP CONWAY, LIVERPOOL,

For training young gentlemen in the Merchant Service. H.M.S. 'Nile,' ninety guns, age of Her Majesty the Queen. The Admiralty give ten Midshipmen, R.N. and are given yearly by the

House, and Royal Geographical Society. Inclusive term 50 Guineas. For Prospectus, apply to the Captain, Archibald T. Miller, R.N., F.R.G.S., as above.



men to become OFFICERS. This vessel, formerly is under the direct patronage of the Queen, who gives annually appointments yearly as R.N.R., and valuable prizes India Office, the Trinity

responsible for their respective statements. In MS. communications all new geographical names should be written in imitation of Roman type.

VOL. **X., No. 2.**
New **Monthly Series.**

FEBRUARY, 1888.

[To Non-Fellows]
PRICE 1s. 6d.

PROCEEDINGS
OF THE
Royal Geographical Society
AND
Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE	
AN EXPLORATION OF THE RIO DÔCE AND ITS NORTHERN TRIBUTARIES (BRAZIL). By Wm. JOHN STEAD, F.R.G.S.	61	GEOGRAPHICAL NOTES . . .
NOTES ON DEMÂVEND. By General A. HOUTUN-SCHINDLER, Persian Telegraph Service . . .	85	REPORT OF THE EVENING MEETINGS
WORK OF THE NATIVE EXPLORER M-H IN TIBET AND NEPAL IN 1885-86 . . .	89	PROCEEDINGS OF FOREIGN SOCIETIES
		NEW GEOGRAPHICAL PUBLICATIONS
		NEW MAPS

MAPS.

THE RIO DÔCE AND ITS TRIBUTARIES
ROUTE FROM MOMBASA TO MAMBOIA

LONDON: EDWARD STANFORD, 55, CHARING CROSS, S.W.
PARIS: ANDRÉAU-GOCCON.
VIENNA: ARTARIA & Co.
HAMBURG: L. FRIEDRICHSEN & Co.
ST. PETERSBURG: WATKINS & Co.
MANCHESTER: JOHN HEYWOOD.
EDINBURGH: DOUGLAS & FOULIE.
DUBLIN: HODGES, FOSTER & Co.
BERLIN: D. REIMER.
LEIPZIG: F. A. BROCKHAUS.
NEW YORK: SCRIBNER & WELFORD.
PHILADELPHIA: LIPPINCOTT & Co.
MELBOURNE: GEORGE ROBERTSON.

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR	"
KURRACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

LIEBIG COMPANY'S EXTRACT OF MEAT

J. Liebig

** Ask for the COMPANY'S EXTRACT,
and see that it bears JUSTUS VON LIEBIG'S
SIGNATURE IN BLUE INK across the Label.

LUXURIANT GLOSSY HAIR

Is assured to those who discard poisonous hair restorers and dyes and cheap oils
which produce eruptions on the scalp, and use

ROWLANDS' MACASSAR OIL,



Known for nearly 100 years as the best Preserver and Beautifier of the Hair.
It contains no lead or mineral ingredients, and can now also be had in a
GOLDEN COLOUR for fair-haired children.

Sizes, 3s. 6d., 7s., 10s. 6d. (Family bottles equal to 4 small).

Ask Chemists for ROWLANDS', and avoid cheap worthless imitations under similar names.

PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

An Exploration of the Rio Dôce and its Northern Tributaries (Brazil).

By WM. JOHN STEAINS, F.R.G.S.

(Read at the Evening Meeting, January 16th, 1888.)

Map, p. 116.

I HAVE the honour, this evening, to draw your attention to a portion of the great empire of Brazil, that at present is but little known—not only to Europeans generally, but also to the majority of the Brazilians themselves. Having resided some three years and a half in one of the northern provinces of Brazil, I determined, in the early part of 1885, to undertake an exploration of the Rio Dôce and its northern tributaries. This exploration, which lasted from June 1885 to January 1886, was undertaken entirely upon my own responsibility, and for no other reason than that of “pure love for the calling.”

The means at my disposal being limited, of course the men I had under my command were few, and with regard to our provisions, all I can say is, these at times were also few, and, as a natural result, I may add that our meals were “far between.” However, notwithstanding these and other drawbacks, my little expedition held stubbornly on its way, and after eight months’ “roughing it,” emerged once more into civilised life with the reflection that it had carried out its self-imposed task to the full.

The Rio Dôce lies between parallels 19°–21° south latitude, and is formed by several small streams springing from the eastern slope of an important range of mountains known by the name of the Serra da Mantiqueira.* This range, running in a north-easterly direction, forms a portion of the irregular “coast-range” of Brazil, and forms, so to speak, the “retaining wall” of the series of elevated, undulating tablelands composing the greater portion of Central and Southern Brazil.† The total length of the Rio Dôce is a little over 450 miles.

* The highest peak in this “Serra” is Itatiaia-assu, which, according to Wells, is 10,040 feet above the level of the sea, and is “the most lofty known elevation of Brazil.”

† See Mr. Wells’s interesting paper on the “Physical Geography of Brazil,” read before the Society, February 8th, 1886.

That portion of the Rio Dôce basin lying east of the Serra dos Aymorés, is a densely wooded lowland, sloping gradually towards the coast from an elevation of about 900 feet. Near the coast this plain resolves itself into a long stretch of low alluvial ground, studded for the most part with small shallow lakes that communicate with each other by means of long, narrow, winding streams, called "vallôes." The largest of these lakes is the Lagôa Juparaná, which communicates with the Dôce some 80 miles above its mouth by means of a narrow, tortuous, deep channel seven miles long. The lake is 18 miles long, and about $2\frac{1}{2}$ miles broad at its southern extremity. It is very deep, and with the exception of some low alluvial ground at its northern and southern ends, is surrounded with high wooded bluffs, composed for the most part of reddish clay overlying a stratum of coarse red sandstone. At the head of the lake is a river—the S. José,* which rises in the Serra dos Aymorés, and flows through an unexplored district, inhabited by wandering hordes of wild Botocudo Indians. Throughout the whole of its course, the S. José flows through dense forest abounding in the much sought-after "Jacarandá," or rosewood tree (*Bignonia cerulea* Will.).

With the exception of two, none of the tributaries of the Rio Dôce are navigable on account of the numerous falls and rapids, which in many instances oblige the traveller to haul his canoe overland. The Rios Sussuhý-Grande and S. Antonio are the two tributaries that offer the greatest facilities for navigation, the latter having a clean stretch of water for the comparatively small distance of 20 miles. The Rio Sussuhý-Grande has a heavy fall a short distance above its confluence with the Dôce, but beyond this fall there is uninterrupted navigation for several miles.

The main river is navigable as far as Porto de Souza, a distance of 120 miles from its mouth. Just above Porto de Souza are the series of heavy rapids known as Escadinhas. In order to pass these, all canoes have to be dragged overland by bullocks, a distance of $3\frac{1}{2}$ miles. Above this, falls and rapids succeed each other at short or longer intervals.

The great charm of this portion of Brazil lies in the grand virgin forests that clothe with unsurpassed magnificence well-nigh the whole of the land watered by the Rio Dôce and its numerous tributaries. On both sides of the river throughout the greater portion of its course these beautiful forests, teeming with a hundred varieties of the choicest timber, crowd closely down to the water's edge, forming an almost

* On the maps that have as yet been published of this portion of Brazil, this river bears the name of S. Raphael. However, this mistake can scarcely be wondered at, considering the amount of errors to be found on every map that purports to represent the valley of the Rio Dôce. On one map that I came across in Brazil there were three or four large islands shown in the Lagôa Juparaná, whereas there is only one island in the lake, viz. the Ilha do Imperador, and that is a very small affair.

impenetrable wall of the most gloriously wild tropical vegetation that can be imagined. When, by the sacrilegious use of axe and knife, the traveller succeeds in forcing his way into the umbrageous recesses of these vast temples of nature, the grandeur and death-like stillness pervading the scene make it well-nigh impossible for him to divest himself of the idea that the place whereon he stands is none other than holy ground.

The immense tracts of virgin forest stretching away on the *north* side of the Rio Dóce are to this day all but untouched by the hand of civilised man,* and hence it is their gloomy recesses afford a safe retreat for numerous tribes of Botocudo Indians, who wander about in the same state of primitive barbarity as that in which their forefathers revelled at the time Brazil was discovered, well-nigh four centuries ago. Now and then these Indians make raids on the outlying settlements, and on such occasions "old scores," that rankle deep in the naturally unforgiving hearts of these wild men, are paid off with frightful interest. Cannibalism is still the order of the day among some of the more savage tribes, but it is some little consolation to learn that this horrid custom is fast dying out, and that ere long it will cease to exist.

Before the valley of the Rio Dóce can ever be opened up, these Indians, numbering, I should say, some 7000, will have to be civilised, or at any rate brought to a state of partial civilisation. The Botocudos have steadily resisted all attempts made to civilise them during the last 380 years, but I firmly believe a well-organised mission might accomplish the work in a comparatively short space of time. The benefits arising would be enormous; the banks of the Rio Dóce would become settled—I will not say colonised—and Brazil would have one of the richest portions of its vast empire opened up and in a flourishing condition.

There are as yet only three little settlements on the banks of the Dóce, and none of these can be said to be in a prosperous state. Linhares, situated on the left bank of the river, 30 miles above its mouth, is a decaying little place, of which we shall have occasion to speak later on. Guandú, a little village situated close to the mouth of the river bearing the same name, is not what it might be, on account of the difficulties of communication with other ports. All products, of which coffee forms the principal, have to go overland † to Victoria (the

* The early settlers in Brazil were drawn into the interior of that country by the hope of finding gold, and in their search after this they always utilised the rivers as highways. Hence in many parts of Brazil we find enclosed portions of country that have never been traversed, although there is civilisation all round these unknown tracts.

† When steam navigation shall have been started on the lower waters of the Rio Dóce this tiresome journey overland will then be a thing of the past. A steamer could run from a little distance below Guandú to the mouth of the river in two days, or say two days and a half. Some few years back it was proposed to construct a railway from Victoria to Natividade (three miles above Guandú), in fact the surveys, &c., were all completed by Messrs. Waring Brothers, of Rio de Janeiro, but up to the present time the railway itself has not been commenced.

capital of the province), a journey occupying ten days. At Guandú there are four or five American settlers, the miserable remnants of a number of colonists who came to Brazil after the Civil War in the States. These colonists, immediately they landed in Rio de Janeiro, were packed off to the Rio Dôce, in order to develop the natural resources of the district, and at the same time make their own fortunes. They were led to believe that of all places upon this earth, the valley of the Rio Dôce was *the* home of the Southerner, and they eagerly embraced the opportunity afforded them. They soon found, however, that they had been duped by those who had persuaded them to leave their native land. Those who could manage to leave the so-called "home" did so, whilst those obliged to remain went gradually from bad to worse, and to-day there is scarcely one of the colonists who would not willingly give all he possesses (which, by the way, is next door to nothing) if he could only turn his back for ever upon the Rio Dôce and its sad associations. The third and last little settlement on the river is Figueira. The inhabitants, numbering some 700, certainly do manage to exist from day to day, but beyond this there is little that can be said.

Salt forms the chief article of commerce on the Dôce, but on account of the difficulty of transporting it by canoes from the coast into the interior, this commodity by the time it reaches its journey's end becomes a very expensive luxury. In Rio de Janeiro a bag of salt weighing 60 lbs. costs, roughly speaking, 1s. 8d. At the mouth of the Dôce its value increases to 3s. 4d. In Guandú the same sack of salt fetches 5s.; at Cuithé it is worth 13s.; and in Figueira it can command something like 16s. 8d.

The valley of the Rio Dôce may be described as a large gap in the great wall of civilisation that, during the last three hundred and seventy years, has been slowly reared along the 4900-miles of the Brazilian seaboard. There is little doubt that Espírito Santo at present is the poorest province in the whole Empire—at all events it is the poorest maritime province. I see no reason why such poverty should continue to exist in a province that is capable of yielding the same products as other provinces. There is not a richer piece of land in the whole of Brazil than that lying between the rivers Mucury and Dôce, yet all this is, figuratively speaking, a desert. Nearly 25,000 square miles of rich, habitable land is lying idle on account of the dread the people of Espírito Santo, and also those of Minas Geraes, have of the Indians. It is very certain the people of the two provinces will never attempt to improve the country; therefore, if anything is ever done to ameliorate this valuable portion of Brazil, it will have to be done by the Imperial Government.

By the way, some of the peasants (*matutos*) have a very curious idea concerning the meaning of the word "Government." One man informed me that if he should ever go to Rio de Janeiro, he should

certainly make a point of "calling upon the gentleman." And this walking mass of rustic simplicity further went on to ask me if I happened to know what his (the Government's) office hours might be.

There is little doubt that the future wealth of this portion of Brazil lies in the immense number of valuable woods with which the virgin forests abound. The following may be mentioned as being some of the principal varieties to be found here:—

Native Name.	Botanical Name.		Use.
	Species.	Family.	
Jacarandá ..	<i>Bignonia cœrulea</i> , Willd.	Bignoniaceæ	Cabinet-making, &c.
Peroba	" <i>similiatrapea</i> ?	"	Construction, more especially ship-building.
Maçaranduba	<i>Mimusops excelsa</i>	Sapotaceæ ..	Used in the construction of piles.
Ipé	<i>Tecoma Ipé</i>	Bignoniaceæ	Construction and medicinal properties.
Sapucaia	<i>Lecythis ollaria</i> , L. ..	Myrtaceæ ..	Construction.
Coração de Negro	"	Leguminosæ	"
Páo d'Arco ..	<i>Bignonia chrysantha</i> , Willd.	Bignoniaceæ	Construction, especially railway "sleepers"; and also medicinal properties.
Vinhatico ..	"	Leguminosæ	Furniture-making, &c.
Angico	<i>Acacia Angico</i> , Mart. ..	"	Construction and medicinal properties.
Argelin pedra	<i>Andira spectabilis</i> , Sald.	"	Construction.
Gráúna	"	"	"
Bicuíba	<i>Myristica officinalis</i> ..	Myristicaceæ	Construction and medicinal properties.
Ararihá	"	"	Ditto.
Sicupira	<i>Robinia coccinea</i> , Aubl.	Leguminosæ	Construction. The bark of this tree has also medicinal properties.
Pequiá	<i>Marfim</i>	"	Construction, more especially for the rafters of houses.
Guarabú ..	<i>Astronium coccineum</i> ..	Terebinthaceæ	"
Cupahiba ..	<i>Copaifera officinalis</i> , L.	Leguminosæ	Medicinal properties.
Andiroba ..	<i>Carapa guyanensis</i> , Aubl.	Meliaceæ ..	" "
Almecegueiro	<i>Bursera gumifera</i> , L. ..	Terebinthaceæ	" "
<i>Plants.</i>			
Guaxima	<i>Helicteres meliflua</i> ? ..	Sterculiaceæ	" "
Ipecacuanha ..	<i>Cephaelis Ipecacuanha</i> , Rich.	Rubiaceæ ..	" "
Salsaparrilha ..	<i>Smilax salsaparrilha</i> , Linn.	Asparaginææ	" "
Sassafray ..	<i>Ocotea cymbarum</i> , Hunt.	Laurinææ ..	" "
Jumbéba ..	<i>Cactus opuntia</i> , L. ..	Cactaceæ ..	" "

The valuable Brazil-wood (*Páo Brasil*, *Cesalpinia brasiliensis* Linn., Fam. *Leguminosæ*) is found in many parts of the Rio Dôce, and is more especially abundant on the lower waters of the S. José.

Concerning the mineral wealth of this portion of Brazil, I am able to say but little. Gold is to be found in various places, more especially in

the neighbourhood of Cuithé. At Onça we found innumerable specimens of what is known as Brazilian crystal, and on the upper waters of the Rios Pancas and S. José we came across garnets. Signs of iron were abundant in most places; and in many parts of the river we found a kind of talc. Tradition speaks of gold having been found in large quantities, years gone by, near the headwaters of the Rio S. José.

The climate of this portion of Brazil is generally healthy. If it were not so, I think the exposure my little party underwent for eight toilsome months would have had a worse effect than was the case. The heat at times is somewhat great, but this is made bearable by the cool, moisture-laden trade-winds, that bring an even distribution of rain throughout the year, thus making the Valley of the Rio Dôce one of the most fertile, luxuriant spots in Brazil.

The first explorer who attempted the ascent of the Rio Dôce, appears to have been Sebastião Fernando Tourinho. In the 'Dictionary of the Province of Espirito Santo,' we read that, in the year 1572, Tourinho left Porto Seguro with the view of exploring the Rio Dôce, but on account of his means being insufficient, he returned to Porto Seguro in order to raise fresh supplies. He succeeded in doing this, and once more started on his journey. How far up the river the explorer went, we do not know; neither do we know exactly the route taken by him and his followers. We are told, however, that the Indians helped Tourinho, upon more than one occasion, in his surveys.

Prince Maximilian von Neuwied tells us that, during his travels in Brazil (1815-17), he visited the lower waters of the Rio Dôce, but I believe the Prince's explorations were confined to the immediate locality around the little town of Linhares, a distance of thirty miles from the mouth of the river.

During the time (1865) the great Agassiz Expedition was prosecuting its researches in Brazil, Professor Hartt, one of the leading spirits of that expedition, ascended the Rio Dôce as far as Porto de Souza, and in a valuable work entitled 'Scientific Results of a Journey in Brazil,' that eminent American geologist gave an account of his journey, which was undertaken in the company of a Mr. Edward Copeland, who was one of the volunteers of the Agassiz Expedition.

More than one attempt has been made to improve the commercial standing of this valuable portion of Brazil, but, unfortunately, every attempt that has been made up to the present time, has hopelessly failed. I must just mention one of these attempts, viz. that organised in the year 1857 by a philanthropical Brazilian, Dr. Nicolaú Rodrigues da França Leite. This gentleman, having obtained permission (and something rather more substantial) from the Imperial Government, endeavoured to settle a number of colonists—principally Italians—upon the banks of the Rio Dôce at a place known as Fransilvania, and also at a place called Limão. But the well-intended work of Dr. França Leite

came to grief, and to-day, there is not a single sign remaining to show that any such attempt at colonisation was made. There is no doubt that the death of young Avelino (a near relative of Dr. França Leite), who was murdered by a party of Botocudos, was the chief cause that led to the break-up of this colony. This unhappy event occurred in the year 1860. The circumstances connected with the death of this young Avelino are indeed sad. Dr. França Leite, who was the overseer of the colony, was called away to Rio de Janeiro on business, and during his absence Avelino was left in charge. It was the custom for the neighbouring tribe of Botocudos—the Nackinhapmás—to visit the colony every now and again in order to obtain one or two little comforts of life, such as tobacco, and a taste of civilised food. Things went on serenely in this way for some time when, by degrees, the Indians began to take a dislike to Avelino. Why, or wherefore, I am unable to say. One day the Indians came down to the colony, and, in the presence of Avelino, deliberately shot his dog. Upon this, two or three of Avelino's friends (my interpreter Moreira was among the number) strongly urged him to leave the colony, but the young man was deaf to the advice that was given him, and bravely remained at his post. A few weeks elapsed, and the self-same Indians made their appearance again. This time, having no more dogs to kill, they put an end to Avelino himself, by striking him across the back of the neck with an axe, while he was quietly eating his dinner. After the Indians had set fire to the few palm-leaf huts composing the colony, they cut poor Avelino into handy-sized pieces, cooked him, and, after resting a while in order to allow digestion to do its work, retired once again into their native wilds. This incident is rendered the more sad, inasmuch as Avelino was shortly to have been married to an accomplished young Brazilian lady who, at the time, was living in Linhares.

I will now proceed to give a rough outline of my journey :—

On the 7th June, 1885, I left Rio de Janeiro, in a small Brazilian coasting-boat, bound for Sta. Cruz in the Province of Espirito Santo. I purchased all the provisions, ammunition, &c., that I calculated would be required for the journey before leaving Rio de Janeiro. I had reckoned that my exploration of the Dóce would occupy me about six months. The chief articles were *carne secca* (dried meat), *bacalhão* (dried cod-fish), and *farinha* (mandioca meal), making sixty large packages.

On the evening of the 8th June the little steamer *Mayrink* reached Victoria, the capital of the Province of Espirito Santo, and the next morning I went ashore to pay my respects to the President of the Province (Dr. Laurindo Pitta de Castro), who appeared to take great interest in my exploration. On the 10th June we arrived at the little seaport, Sta. Cruz, and there I landed with my stores. A small steamer used to run occasionally from Sta. Cruz to Linhares on the Rio Dóce, but

at the time of my arrival it had broken down, and I was obliged to arrange for a march overland to that settlement. Fortunately a Senhor Pinto was about to undertake the journey and so I left Sta. Cruz with him, on the 11th June, and after two days' hard riding, over somewhat hilly ground, reached the Rio Dôce. Linhares is an insignificant village, consisting of little more than a square, the houses of which are small, and, for the most part, inhabited by peasants who seemed to have no regular occupation beyond that of loafing about.

Prince Maximilian, in his 'Travels (1815),' speaks of Linhares as "a poor, insignificant settlement, the houses low and mean . . . built of clay, unplastered, and small. It is built in the form of a square; there is no church yet, but a large cross of wood. Mass is said in a small house." I am sorry to say that what Linhares was in the year 1815, so it is to-day, with this one exception. In the Prince's time there never had been a church, whereas now one can see by the ruins that at least two churches have been started, at different times, but neither of them has come to anything. One church has come to grief entirely, and the other, or rather what remains of the other, has been converted into a blacksmith's shop.

The past history of Linhares well accounts for its present state. We read in the 'Dictionary of the Province of Espirito Santo' (before quoted) that Linhares was founded in the year 1792, and that the little settlement was peopled by criminals who, having escaped the eye of the law, had fled to the banks of the Dôce as a kind of city of refuge.

With all its faults, however, I believe that at some future time Linhares will become a thriving commercial town. The ground on which it stands is without doubt the finest site for a town throughout the whole valley of the Dôce, being well elevated above the river, and therefore out of the reach of the heavy floods that in this part occur annually.

By the 28th of June I had purchased my canoes, and got the expedition into something like working order. I had engaged six men (four Brazilians, one Scotchman, and a Portuguese interpreter) to accompany me. My first journey was to the mouth of the river. We reached this place at midday on the 1st of July, and pitched our camp on a long, sandy neck of land on the north side of the river, opposite Regencia. Here the Dôce is about a mile and a half wide. It was my intention to stay some time here, in order to make a detailed survey of what, it is to be hoped, will some day be a recognised port of Brazil. At present the Barra of the Rio Dôce is scarcely counted in the same category with other, and in some cases far inferior, ports of the Empire. Beyond the fact that a few small sailing vessels, hailing from Rio de Janeiro, call here now and then for the purpose of carrying away timber (chiefly Jacarandá, or rose-wood), there is no trade whatever.

On the 9th July we returned to Linhares, and on the 16th July we

left Linhares in order to explore the Lagôa Juparaná and Rio S. José. During this journey I detected a mistake that has been made in all the maps of this portion of Brazil that have as yet been published, namely, the mistake of showing two rivers (the S. Raphael and the Rio Preto) running into the northern end of the Lagôa Juparaná. There is only one river running into this lake, and this river bears the name of S. José. Before I ascended it with my little party the S. José was entirely unexplored.* We were employed a month in ascending and descending this river.

Our greatest trouble was the almost total wreck of our canoe whilst shooting a rapid, and our lightest trouble the having to drink our coffee minus sugar for more than a fortnight. We encountered more than a dozen falls, and the rapids were innumerable. The first *cachoeira*, or fall, in going up the river was about 100 yards long, with a total fall of 24 feet, which meant, as far as we were concerned, one and a half day's hard labour. I am speaking of the time we took in ascending this fall. We descended it, upon our return journey, in about half a minute. Besides the rapids we had to encounter another kind of obstruction in the dense thickets of a leguminous tree, known as *Ingá*, that abounds on the upper waters of the river. In many places we simply had to cut our way through these *Ingá* thickets.†

The furthest point reached by us on the Rio S. José was a picturesque cataract that presented itself on the afternoon of the 26th July. We camped at its foot for two days, leaving for our return journey on the morning of the 29th July. I named this place the Leila Falls. The scene presented by these falls was of exquisite beauty; they are about 40 feet high, and 80 feet wide. We were now in the heart of the territory occupied by a tribe of Botocudos, known by the name of Pojicha. Some distance from the Leila Falls, away in the depths of the forest, we came across a deserted hut belonging to these Indians. I found out afterwards, that during the time we were up the S. José, these Pojicha Indians were hovering round the town of S. Matheus, causing every now and again great alarm to the outlying farmers (*fazendeiros*) of that place. Cattle were stolen by the Indians, and it was reported that the two daughters of a wealthy fazendeiro had disappeared, supposed to have been carried away by the Indians far into the interior, where a rescue will be impossible.

* Professor Hartt, in his 'Scientific Results of a Journey in Brazil' (Agassiz), says, "At the head of the lake (Juparaná) there enters a little river . . . It rises in the forest, in the country of the Botocudos, and has never been explored."

† There are about 140 species of *Ingá*. The *Ingá* referred to above is known by the name of *Ingá bahiensis* Benth. This tree is remarkable on account of its straggling habit. It is only to be found in those portions of the rivers which flow through swampy ground. Where the rivers are narrow (say 18 feet wide) the *Ingás* whose main roots grow on the banks, send forth a number of shoots which extend over and into the water, and become densely interlaced, thus causing the obstruction to navigation.

I was now brought face to face with the worst trouble experienced during the whole of my exploration, a trouble compared with which all the dangers to be feared from waterfalls, Indians, wild beasts, fevers, and agues were nothing.

Shortly after my return to Linhares, I found that all the money that I had brought with me from Rio de Janeiro was, through unforeseen expenses, exhausted. What was to be done? I could not endure the thought of selling off—and most likely at a loss—the provisions, ammunition, &c., belonging to the expedition, and abandoning my undertaking; therefore I decided to lay the state of affairs before my men. Calling them together, I told them that they would not be able to receive their pay until the expedition returned to Rio de Janeiro. The men were prepared to hear this, inasmuch as it was upon this understanding they had been engaged. I then went on to inform them that they would not receive a single penny in advance, beyond what they had already received; and in short, that my ready money was exhausted. The men looked somewhat “blue,” and one or two began to mutter something to the effect, that if such were the case they would not stir a yard. I then appealed to their good feeling in a set speech, and my harangue produced the desired effect. They sat silent for a few moments, looked at one another like so many sheep gone astray, and then with one accord said, “Doctor! we will follow you to the end.” There was no need for further words: a hearty shake of the hand all round, and the contract of allegiance was sealed. Having thus gained the loyalty of my men, I determined to leave Linhares as soon as possible. Accordingly, on the 31st August, we started on our long and arduous journey.

On the 3rd September we reached the mouth of the Rio Pancas, one of the northern tributaries of the Dôce, situated 54 miles above Linhares. It was my intention to ascend this river in the same manner as I had ascended the S. José; therefore, on the following day, four of the men, with myself, started off in the smaller canoe *Lily*, leaving Adriano and William in charge of the main camp, and the bulk of the provisions. Shortly after midday we arrived at the first fall on the Rio Pancas (Cax. dos Bugres). Here we were obliged to unload the canoe in order to haul her over the rocks. By five o'clock in the afternoon we had the satisfaction of camping above the fall.

On the next day we passed, at short distances from each other, two rapids, in order to ascend which we again had to take out cargo. At 2 p.m. we came to another rapid, about 200 yards long, very narrow, and rough. We unloaded the canoe, and hauled her over the rocks on east side of rapid, a distance of 160 yards. Fair sailing the remainder of the afternoon, with the exception of one portion of the river which was somewhat blocked with Ingás.

On September 6th we observed the first footprints of Indians, and

on the next day (September 7th), after surmounting four other falls, we found an Indian bridge—a narrow tree-trunk that had fallen across the stream—with a long piece of creeper stretched across and tied to a tree on either side so as to form a kind of hand-rail; the Indians having utilised this natural bridge in order to allow their women and children to cross. More proofs of Indians being in the neighbourhood showed themselves as we proceeded up the river. We passed another rustic bridge, and on nearly every sandbank we saw undeniable footprints. We measured up a few of these footprints, and satisfied ourselves that the Indians (whatever may be their other failings) at all events possess small feet. We also came across an apparatus for fishing. It was a simple affair, consisting of a number of stakes driven into the bed of a shallow portion of the river so as to form a kind of enclosure or trap.

Towards the latter end of the afternoon our progress was impeded by a large *Jequitibá* tree that lay stretched across the stream. We had to stop for quite a quarter of an hour in order to allow the men to cut away the obstruction with their axes, and here it was that we knew for certain that Indians or "Bugres" were close at hand, inasmuch as when the men were resting for a few moments from their labours, we distinctly heard a rustling in the forest as if somebody was running away. I ordered Moreira to call out to the invisible fugitive to show himself and all would go well; but the fugitive, whoever he was, did not obey. The tree having been cleared away, we continued our journey upstream. The river now commenced to be very narrow, and our progress was greatly impeded by fallen tree-trunks and dense *Ingá* thickets.

At 5.30 p.m., the men being thoroughly tired out, we sighted a small sandbank, and camped on it for the night, sleeping on ground that was studded with the fresh footprints of Bugres.

Next day we had our first encounter with the Indians. We had just turned a sharp bend in the stream, when I caught sight of a reddish form peering through the trees not more than ten yards from the canoe. This was quite enough. In the deep silence of that primeval spot old Moreira's voice, in obedience to my order, rang out loud and clear, "Juck-jum-nook Jacarung! . . . ning amancoot . . . ouroohoo-o-o-o!" which means, "We are your friends; we invite you to come and eat something." For a long time there was no reply, but we could hear a low mumbling going on in the woods. The Bugres were evidently holding a consultation among themselves. It was not until after a fresh invitation shouted out by Moreira that we heard a reply to the effect that they would come out if we would promise faithfully not to hurt them. "Hurt them, Moreira? I should think not. Tell them to come forward like men, and they will find us perfect brothers." The old interpreter called out once more, and then we were suddenly face to face with eight lean, wiry, stark naked men, each carrying a bow and a

bundle of arrows, and two or three wore around their necks pieces of string (*imbira*) to which small, roughly made knives were attached.

The tribe of Indians * to which these savages belonged numbered about seventy souls. We stayed with them nearly a month, and during that time I had an opportunity of studying their manners and customs, from early dawn till late at night. In appearance the Botocudos † can scarcely be called prepossessing. Some of the young girls certainly are pretty and well formed, but this girlish beauty is short-lived, inasmuch as among the Botocudos it is the custom (born of necessity) for the girls to marry at a very early age. I saw a striking example of one of these early marriages in the case of a young Indian, whose partner for life was just entering her ninth year; the husband was well into his twentieth. The average height of the Botocudos is five feet four inches. Their chests are very broad, and this accounts for the facility with which they can bend their bows, which are exceedingly strong, being made out of the tough springy wood of the Ayri or Brijaubá palm (*Astrocaryum Ayri* Mart.). The feet and hands of the Botocudos are small rather than delicate, and these are in fair proportion to their legs and arms, which are lean but muscular. Concerning the colour of their skin, these Indians are of all shades, some being of a dark reddish-brown, whilst others, and especially the women, are quite light. With regard to features, the Botocudos struck me as bearing a wonderful resemblance to the Chinese, and if instead of wearing their hair cut round their heads so as to form a kind of mop they wore pigtails, the casual observer would scarcely be able to tell where the difference lay.

The hideous custom for which the Botocudos have always been so famous, viz. that of wearing huge lip and ear-ornaments of wood, is fast dying out, and at the present time is only to be met with among some of the older members of the tribes, who retain all the habits and manners of their primitive forefathers intact.

* This tribe of Botocudos is known by the name of "Nackinhapmá," which signifies "beautiful land."

† The Portuguese settlers, at the beginning of the present century, gave these Indians the name of Botocudos, on account of their wearing the *botoque* (lip-ornament). The Botocudos were formerly known by the name of Aymorés, or Aimurás. Martius grouped six tribes (or clans) of Indians, whom he found inhabiting this portion of Brazil, under one head, calling them "Crenas," on account of that word, which means head, being found in all the vocabularies of the languages spoken by the six tribes, viz. Botocudos, Puris, Corôados, Malalis, Ararys, and Xumetos. A craniological similarity has been found to exist between the Sambaquis, a prehistoric nation inhabiting Brazil, and the Botocudos. This discovery has led some people to imagine that the Botocudos may possibly be the living remnants of a long since departed age. I have used the word Sambaquis as if it signified the name of this prehistoric nation. In reality, however, the word only signifies the shell-mounds, or tumuli, in which the skulls, stone implements, &c., of these primeval men and women (?) are often found. In Brazil these human remains are said to belong to the "Homem dos Sambaquis" (the men of the shell-mounds). The shells mentioned in connection with these mounds are oyster-shells.

These lip-ornaments are made out of the light wood of the Barri-guda tree (*Bombax ventricosa*, fam. *Bombacace*). A regular process has to be gone through before a Botocudo can boast of wearing a lip-ornament, say, three inches in diameter, and what is more, it is a life-long process. When the Indian is about three or four years old its parents pierce a small hole in the centre of its under lip and also in the lobes of its ears. Into this hole a small plug of wood is inserted about the size round of a pencil. In the course of a few weeks a larger piece of wood is made to take the place of the first insertion, and so on, until at last the lip (having been stretched thus gradually) is capable of receiving a *botoque** (plug) of the dimensions mentioned above, viz. three inches in diameter. It generally happens that in course of time the lip, which stretches round the botoque just like an elastic band, splits. This action on the part of the lip, however, does not prevent the further wearing of the botoque. The Indian simply ties the two ends of his broken lip together by means of a small piece of imbirá, or stringy bark, and thus mends the breakage in a way that is decidedly more useful than ornamental.

As a rule the Botocudos live to a good old age. The Indian who is gathered unto his fathers when he is seventy years old is considered by his sorrowing relatives as having been cut off in the bloom of youth, but at the same time, this does not prevent the relatives from leaving the dying wretch behind if they happen to be on the march. They argue that if he gets well again he can always get up and follow them. And so he can, inasmuch as when the Bugres are on the march it is their custom to break twigs of the trees along the route they have taken, in order to mark the way for any members of the tribe who may have lagged behind.

The Botocudos live chiefly upon the nuts of two or three varieties of palm-trees. These nuts (the shells of which are cracked by the aid of stones) are exceedingly hard, and therefore, in order to allow the aged members of the tribes and the young children to digest their food properly, the women thoroughly chew the nuts, and then taking the already pulpy mixture out of their mouths, these thoughtful females offer the same to their fathers or their children, as the case may be, who eagerly accept this prepared food, and what is more, seem to enjoy it. The chief palms furnishing food for the Botocudos are the Ayri (*Astrocaryum Ayri* Mart.) and the Indaiá (*Attalea compta* Mart.). The nuts of the latter are, however, esteemed by the Indians more highly than the nuts of the Ayri palm, inasmuch as those of the latter are somewhat bitter. Indaiá nuts contain a great amount of oil.

These Indians spend their days in hunting, fishing, and seeing to their bows and arrows, whilst the women look after the children, gather nuts and other fruits for the day's consumption, and do the hard work

* This is a Portuguese word.

generally for their lords and masters. Whenever a fresh hut has to be built the women are the architects and builders, and when the tribe is on the march the women resolve themselves into nothing more nor less than household removal vans, inasmuch as the men will not deign to carry anything except their bows and arrows. Clothing of any sort is entirely unknown among these wild people.

The Bugres have no stated hours for eating, in fact they never know from one hour to another whether they will find anything to eat. Hence they are not tied down by domestic laws and regulations. They sleep when they like; hunt, fish, sing, and dance just when they feel inclined, and eat when they can.

Among the Botocudos, a plurality of wives is allowable, but one seldom finds a Bugre indulging in the luxury of more than one wife, because he knows full well that he would have to provide food (in the way of game, &c.) not only for an extra wife, but, in all probability, for an extra family; and that is a great consideration, inasmuch as the virgin forests do not by any means yield an inexhaustible supply of animal food; on the contrary, game is exceedingly scarce, and requires much careful tracking on the part of the hunter. This scarcity of game, however, is only to be found in those portions of the forest that have been much frequented by Indians, and therefore we find in certain places (up the Rio Tambaquary for instance) a profusion of game, whereas in other parts it is all but extinct.*

The Botocudos have no form of government, except that of a chief (*capitão*) for each tribe. The chief, however, possesses no real authority over his tribe. He is generally the best hunter, and such being the case, the bulk of the hunting, especially in hard times, usually falls to his lot.

The religion of these Indians is primitive in the extreme. They believe there is a certain great spirit who has made the world (their world), but no prayers or sacrifices are offered. When a thunderstorm occurs they take it as a sign that the great spirit (*coopân*) is very angry, and they accordingly become frightened. Some of the bolder spirits in the tribe, however, throw firebrands into the air, thinking that by doing this the wrath of the great spirit will be appeased, and that the thunder will stop. They believe that when a man dies, his ghost wanders about upon the earth in a kind of seeking-whom-he-may-devour manner, i. e. the ghost of the departed Bugre will be the means of

* This scarcity of game in the Indian territories will doubtless be the chief cause that will eventually result in the extinction of the wild Indian in this portion of Brazil. Take, for instance, the case of the Nackinhapmá tribe of the Rio Pancas. These Indians have a certain amount of country, over which they can roam, without being interfered with by any other tribe. But supposing, on account of the scarcity of game, the Nackinhapmá should wander into the adjoining territory of the Incutcracks. What would be the result? Immediately the Incutcracks might become aware of the intrusion, they would have a general call to arms, and this would end in a deadly struggle, resulting in the entire extermination of one or the other of the tribes.

causing harm to happen to all those who, during this life, have ill-treated him, and, on the other hand, that same ghost will be the means of benefiting all those persons who may have shown kindness to him when on earth. These Indians have a hazy idea of the evil one, who, they believe, resides in the body of a certain night-bird, which is accustomed to screech out during the most unearthly hours of the night, thus waking the Bugre out of his first sleep.

On the 27th September we continued our journey up-stream, and on the following day reached a place called Mutum. Here, on the south bank of the river, there is a small village of semi-civilised Indians, consisting of twenty-four souls, viz. six men (with trousers), eight women (with petticoats), and ten children (with nothing at all). This village is under the supervision of the Imperial Government. On the north bank of the river—just opposite this village—are the ruins of a mission that was started, some fifteen years ago, by a worthy Capuchin monk, Frei Bento. The object of the mission was to civilise the Indians in the neighbourhood of Mutum, but on account of a misunderstanding that arose between the civilised Indians belonging to the mission, and the wild tribe known as the Incutcracks, the whole affair came to an end; Frei Bento's interpreter, Daniel, was killed, and the remaining members of the little settlement, if they had not fled across the river, would doubtless have shared the same fate. Since this unhappy event the mission has become totally neglected, and nothing remains but the desolate ruins of a few houses and a large wooden cross to mark the spot where philanthropy once attempted to take up its abode, and failed.

On the 6th October we reached Guandú. We were now at the foot of the huge falls called the Cachoeira das Escadinhas. I was obliged to desert my small canoe at Guandú, inasmuch as it would have been absurd to have attempted to take it any further, on account of the rough water that we should have to contend with during the remainder of the voyage.

With some difficulty we made arrangements with a native of Guandú for the use of six bullocks, and, with the aid of these animals, we managed to drag our large canoe overland—a distance of three miles—to a place called Natividade. Here we were able to set it afloat once again, but before doing this our camp had also to be removed from Guandú. There were no bullocks to help in this labour, for we could not afford to pay for their further hire. We had been forced to draw upon our provisions in order to recompense the owner of the bullocks for their services in dragging the canoe, and we could not possibly afford to part with anything more in the way of food, and a cash payment was out of the question. We commenced to remove our camp from Guandú on the 12th October, and after a week of tedious marching through dense forest, we had the satisfaction of camping above the falls that had given us so much trouble.

At the falls called Do Inferno, and at the Cachoeira do M, we were obliged to drag the canoe along by ropes made of woody creepers. A rope is fastened to the bow of the canoe, and two men holding fast on to it, jump from one rock to another, and thus tow the canoe along. A third man remains in the bow of the canoe, and with a long pole prevents the canoe from being dashed against the rocks, whilst the pilot, with his heavy broad-bladed paddle, steers the canoe through the narrow openings between the rocks, and shouts his orders to the men, in a way that makes one fancy the whole canoe and its contents must inevitably be lost. The noise made by the rushing water adds greatly to the confusion that always prevails when a rapid is being ascended.

On the 29th October, we reached the mouth of the Sussuhy-Grande, one of the principal tributaries of the Rio Dôce. We entered this tributary, and found it to be wide and deep. Our travelling was easy for a distance of two miles or more, and then we were obliged to stop. As usual, the obstruction was a fall. We camped upon a sandbank just below the fall. Our provisions had at last come to an end, and here we were, at the foot of this first fall on the Sussuhy-Grande, dependent upon our guns for future support. The last spoonful of sugar had been dissolved, the last cup of coffee had been served, the last grain of *farinha* (flour) had disappeared, and the only remaining piece of *carne secca* (dried meat), a piece about three inches square and half an inch thick, had gone mildewy that very morning. The men behaved admirably under the circumstances, and few were the murmurings that escaped their lips, although at times, I know the poor fellows were sorely tempted to mutiny. We, however, ascended the Sussuhy-Grande and, on the 5th November, entered the Rio Tambaquary, a tributary of the former river.

I determined to ascend the Tambaquary in the same manner as I had ascended the rivers S. José and Pancas. The men, however, although I had more than once intimated to them my intention to explore this river, pretended not to know anything about it, and after we had paddled a short distance up they asked me if it was time to turn the canoe about. "No, go-a-head, until you are told to turn back," was my reply to this insidious query. The men went ahead; and it was not until the 24th November that we commenced to turn back.

On the 12th November, having reached a fall over which the big canoe could not possibly pass, we commenced making a smaller canoe, and this piece of work occupied us three days, inasmuch as we only had axes to work with. When the canoe, which was made of somewhat soft wood, was finished, we discovered that it would only hold five persons, and even then the water-line was within three inches of the gunwale. However, leaving two of the men in camp at Caçete, the other five started off in this risky kind of conveyance, and we thus continued our exploration of the Rio Tambaquary, returning from our furthest point

reached on that river, viz. 32 miles from its mouth, on the 24th of November.

Sometimes we had food enough and to spare, whilst, at other times our larder (the bow of the canoe) was completely empty.

As a substitute for bread, we had recourse to a vegetable, known as *palmito*. This is the top shoot of a species of palm (*Euterpe oleracea* Mart.), that grows in profusion in the dense forests of the Rio Tambaquary. In order to secure the palmito we were obliged to cut down the whole tree, and hence during our exploration of the Tambaquary, we made terrible havoc among these beautiful, slender palms. Upon an average we cut down fifteen trees a day, and I calculate that, during our exploration of the river, no less than four hundred and fifty of these palms were laid low, in order to supply our hungry little party with food. Of course we did not exist entirely upon palmito. This, as I have already said, was merely a substitute for bread. Our guns did us good service in bringing us a variety of game.

Some of the animals, consisting of monkeys, pacas, cotias, capyvaras, &c., were very good eating indeed, whilst others were decidedly the reverse. The same will apply to the various birds that we shot. In the animal way we esteemed monkeys as well as anything, and more especially those of a species known as "Barbados" (*Myceles ursinus*). Our favourite eatable birds were wild ducks, mutums (or curassows), jacus, jacutingas, and jacupebas (*Penelope marail* L.). Upon one occasion we tried to eat an *arara*, or macaw, but we were unsuccessful. We got half-way through what we thought would be a tit-bit, and then we decided to give the remainder to the dog. Capyvara is very poor eating, its flesh being tough, and of a decidedly strong flavour.

At times we had good fishing, surubim being the largest species that we caught, and piáu, piabá, and piabanha the most tasty.

On the 10th December we once more reached the mouth of the Sussuhy-Grande, and on the following day arrived at the little village of Figueira. Between the mouth of the Sussuhy-Grande and Figueira, a distance of eight miles, we found travelling extremely difficult. We were obliged to hug the bank, and adopt a tedious process known as the "fork and hook," in order to make any way at all. Flood-time had just commenced, and the Dôce was full. On account of the depth of water and the terribly strong current, either poling or paddling was out of the question. Therefore we simply had to pull the canoe along by means of the bushes that grew very densely on the banks of the river close to the water's edge. The fork and hook is a tedious process, but at the same time it is the only safe one that can be adopted on certain parts of the river during flood-time.

We were delayed at Figueira some days, on account of three of my men being sick, but on the 18th December the expedition pushed upstream again, so as to make good headway before the floods should reach

their height. We had comparatively easy travelling until we reached the Caxoeira de Baguary, 20 miles above Figueira. This was the first fall pure and simple that we had met on the main river, and a beautiful fall it was—not so very high (30 feet), but nevertheless quite high enough to cause us a fair amount of labour before we could pass it. We were fortunate enough to meet with a small party of fishermen hailing from Figueira at the foot of this fall, and with their help, given in exchange for some powder and shot, we got the canoe over Baguary in far less time than we should otherwise.

On Christmas Day we reached the mouth of the Rio S. Antonio. We entered this river, and camped some six miles up. The Rio S. Antonio was the finest tributary of the Dôce we had yet ascended, being broad, deep, and well suited for navigation for a distance of 20 miles from its mouth. Beyond this, however, the S. Antonio loses its good character entirely, and, like so many of the smaller rivers of Brazil, becomes a succession of falls and rapids. About 10 miles up the S. Antonio there is a small settlement called Naque, so named on account of a village (*aldeia*) of the Nackerehé tribe of the Botocudos having stood here years ago. We stayed at Naque for a short time, on account of my interpreter (Moreira) having some relations there whom he had not seen for twenty years. This will suffice to prove how very rare communications are between one place and another in this part of the world. Moreira had been living in Guandú, and (although as the crow flies the distance between Naque and Guandú is only 85 miles) he had never been able to visit his friends.

I noticed that a great number of the people living at Naque suffered from wens in the neck. Sometimes every member of a family would possess one of these unsightly excrescences, and in many instances the wen would be of such enormous dimensions that it would reach far round the neck of its owner. The people here say that these wens are caused by the water in the neighbourhood being full of lime.

Another disease very common among the people is leprosy. I have heard from good authority that in the town of Joanezia, a person with a wholesome body is quite a *rara avis*. This leprosy is possibly caused by the heating food that the *Mineiros*, for the want of knowing better, are accustomed to live upon, viz. *toucinho* (bacon fat), and *farinha do milho* (flour made from Indian corn). The peasants make it their special business to rear pigs for the sole purpose of obtaining their highly-prized bacon fat.

On the 29th December we left Naque, and on the following day arrived below the Caxoeira do Escuro. We found this fall very similar, both in size and appearance, to Baguary, only not quite so wide. The expedition floated away again, up-stream, on New Year's Day.

For some time past we had been terribly worried by mosquitoes and other insect pests. All day long, *matucás* (large brown flies of a very

vicious temperament), *capôtes* (smaller flies, that look as if they had had the ends of their wings snipped off), and *borrachudas* (small sand-flies), allowed us no rest whatever; and at night, after these had quitted the field, large reinforcements of mosquitoes would come up and finish what their allies had begun.

On the 5th January the expedition reached the Caxoeira do Surubim. This was the worst fall we had encountered since leaving Escadinhas—now 150 miles in our rear. The work of hauling the canoe by land over the Caxoeira do Surubim was both long and tedious. We dragged the canoe out of the water on the morning of the 6th January, and not until the evening of the 11th were we able to set her afloat again.

During those six days we made a little over 80 yards' progress.

This was the last fall passed on the Rio Dôce, and our wanderings on that wild strange river were at an end. A day later my little party camped at the foot of another fall, the Caxoeira da Ponte Queimada, but we did not pass it. My poor men, on account of the hardships and privations we had undergone during the last two months and a half, had not only lost muscle, but heart, and now I was rendered helpless and weak by an attack of fever, which was followed almost immediately by an acute attack of ague.

At a small village called Sacramento (13 miles E.S.E. of Ponte Queimada) arrangements were made for a mule-troop to carry my little worn-out expedition down to S. Geraldo, a station on the Leopoldina Railway. We were twelve days on the road, the distance being about 160 miles. We passed through three or four small villages, the inhabitants of which looked at us with those intellectually bland expressions which Brazilian *matutos* (peasants) always assume when they do not quite understand anything.

We reached S. Geraldo on the 30th January. The following day I took the train (a sixteen hours' journey) to Rio de Janeiro, where my first visit was to the London and Brazilian Bank. Four days later I returned to S. Geraldo, settled up accounts with the worthy owner of the mule-troop, and then on the 6th February I brought my men down to the Brazilian capital, whence they were shipped back again to their sweethearts and wives in Linhares. Our wanderings, hardships, trials, and vexations were at an end, but my ague was not. That did not leave me until I had nearly reached home in old England, where I arrived on the 29th May, 1886.

Before the paper:—

The CHAIRMAN (the Hon. G. C. Brodrick) said that Mr. Steains originally went out to South America in connection with a commercial undertaking and the formation of railways, and having accomplished his duty in that direction he undertook the exploration of the Rio Dôce, which seemed to have been but little explored before, though a few travellers had gone a certain way up the river. It was strange that that should be so, considering that it was in Brazilian territory, and at no great distance from Rio Janeiro.

After the paper :—

Mr. COLIN MACKENZIE said he had not had the good fortune to visit the part of Brazil of which Mr. Steains had given such an interesting account, but like all students of Brazilian geography he saw the immense importance of the work that Mr. Steains had done. It would hardly have been expected that in a country which had been settled for nearly 400 years the natives would have been in such a condition as had been described. To the north of them was the old capital of Bahia, which with its province had a population of a million and a half; to the west of it was Minas Geraes with an equal population, and to the south of it was Rio Janeiro, the population of that province being two millions. The Rio Dôce district was thus surrounded by the oldest and most settled parts of the Empire, and yet it was practically unknown. Mr. Steains had been able to explore three of its tributary rivers which had never been explored before. The unexplored portion lay between the river Mucury on the north and the Rio Dôce on the south, while it was bounded on the west by the mountain range of the Aymorés. Mr. Steains had for the first time explored and given us information about the three rivers Tambaquary, San José, and Pancas. Whilst other travellers had obtained their knowledge of the Botocudo Indians from casual interviews with them, Mr. Steains, at great personal risk, had proceeded right into the heart of their wild country, and had spent a month among them. It was an extraordinary fact that the description he gave of their customs was identical with that in the old books relating to the first landing on that coast and the first interview with the natives by Cabral, the discoverer of Brazil. When Cabral was on his way to India he was driven to the extreme west by a series of winds, and discovered by accident the coast of Brazil, finding the first safe anchorage for his vessels at Porto Seguro. When he sent a boat ashore to investigate the country the men returned and told him that they did not believe the natives were men, though they were dressed up in feathers and painted in colours, for they had two mouths. It appeared that the Indians were accustomed to take out the lip-ornament, and whilst the teeth were grinning from the upper mouth the tongue was pushed out from the lower one. History repeats itself. 280 years later, when Cook was on his last fatal voyage in search of a north-west passage by the Pacific, he came to the southern shore of Alaska, the first time it had been reached by a British navigator, and at Prince William's Sound he heard one of the sailors say to his companion, "Come here, Jack, look at the men with two mouths." It seemed that the Eskimo on the coast of Alaska had the same custom of making a slit in the under lip and inserting a piece of wood or coloured stone. He (Mr. Colin Mackenzie) had in a very cursory way followed out the geographical line of this singular custom, and he found that it could be traced from Alaska to the coast of Brazil with very few breaks. The inhabitants of Sitka when they were first visited by Cook, by La Perouse, and other navigators, had that custom in full swing, and one writer described the size of a lip-ornament of the wife of a great chief. By a singular motion of the lower lip she could raise it in such a way as almost to cover the whole of her face. Probably that race would have been able to take the prize for that sort of exhibition, but the Botocudos evidently came very near them. Some years ago a very intelligent French artist visited a colony about midway between the capital of Victoria and the south bank of the Rio Dôce, for the purpose of collecting objects of natural history and painting Brazilian scenery. He was told that a party of Botocudos were passing through the village and he immediately decided it would be an excellent chance to paint the portrait of the chief, so he rushed out, showed them into his house, and hospitably gave them each a piece of meat to eat. The chief made signs that he wanted a knife. A knife was provided, the chief took the meat in one hand, the knife in the other, placed the

meat on the lip-ornament, cut off a piece and then raised the lip in such a way that the morsel passed into his mouth, and so he went on until he had finished the whole of what was given him. The lip-ornaments were also found in Prince Charlotte's Island, in Vancouver's Island, and down close to the northern boundary of the Columbia river. The corresponding ear-ornament gave the name to the territory of Oregon, which in Spanish meant Big Ears. In the peninsula of South California, where the native tribes were less subject to incursions and wars, the same system was in full swing at the time of the visits of the early Spaniards. From old Mexican pictures it was evident that it was one of the signs of a chief to wear the lip-ornament, generally formed of some precious metal or green jade. In Central America there were four or five tribes, especially hill tribes, who wore these ornaments. In Peru the same ornament was seen on the older monuments. In the valley of the Amazons four or five tribes were known who had the same custom, and a further tribe was recently discovered at lat. 11° S. by the German expedition which went down the Xingú river. There was one tribe in Maranhão called the Gamella, which meant a shallow trencher carved out of a solid block of wood, so that it was easy to show that there was an almost continuous connecting line between the North American Indians of the Pacific coast and the South American Indians, and that might be looked upon as a corroboration of the fact of similar origin already derived from an investigation of the language and physical characteristics. But the custom which connected them more fully with the other wild tribes was cannibalism. He (Mr. Mackenzie) was residing in Rio in 1860 when those dreadful events took place which had been referred to in the paper, and he thought they were even greater in extent and atrocity than Mr. Stearns had stated. The people in Rio who had not actually seen it did not doubt the murders, but they doubted the cannibalism, so one of the learned societies in Rio set to work to investigate the matter, and they arrived at the conclusion that there never had been cannibalism in Brazil. That appeared to some persons as an attempt to prove rather too much, because just at that time, or a little later, Sir Richard Burton had, from his Consulate at Santos, investigated the whole coast-line mentioned in the oldest book connected with the natives of Brazil, namely, the imprisonment of Hans Staden by the natives. He had verified every geographical fact connected with it, and that had led him to the conclusion that the other facts mentioned in the book were undoubtedly true and that cannibalism was practised, and that the worst tribe of all were the Botocudos. At last it became a terror for any of the people settled in Bahia to go to Espírito Santo, because they were unable to cope with the cunning and ferocity of the Aymorés who occupied that portion of the country. Notwithstanding all the efforts that had been made from north and south, those tribes had been able to hold their own against the white man for nearly 400 years, and so tenacious were they of their original customs, that what had been described in the paper was almost a repetition of what was seen by the original discoverers and visitors of Brazil. Their decreasing numbers would seem to imply that Mr. Stearns, and he might also say those who had heard his interesting paper, had been assisting at the death-bed of an expiring race, but as they were totally and completely alien to any advance towards civilisation, and as every effort made by the Government through the Capuchin monks, the Jesuits, and other agencies, to get them to settle down to a civilised life had failed, it appeared that after all there was this compensation for the loss of the tribe—that it would open up a richly endowed region to the benefits of civilisation and Christianity.

Mr. WELLS said he was quite sure that geographers would much appreciate Mr. Stearns's contribution to a better knowledge of a very little known coast region of Brazil; especially when it was remembered that he had not only carried

out his exploration at his own cost—and as he observed, for the “pure love of the calling”—but he had brought back the results of his observations in a very practical form. This labour of Mr. Steains would be all the more commended if people were only aware of what a considerable amount of exploration was always going on in Brazil, and yet so little of which the outside world hears. Even the Brazilian Government, who had ordered surveys of rivers and regions for various purposes, appeared in no wise to benefit from their labours; the surveys were made, paid for, and the plans then relegated to the dark oblivion of official archives and there forgotten. The Government had built thousands of miles of railways, and navigated by steamers thousands of miles of rivers. English companies and native companies have done the same, yet the world was none the wiser for any more geographical knowledge of those many and vast regions traversed; therefore they should be proportionately grateful for such knowledge as explorers like Mr. Steains brought to them in maps, or other information of such regions as circumstances or their own desires might have led them to explore.—In the paper there were a few points to which he would like to briefly direct attention. The fact of such a gap in the civilised regions of the coast as the basin of the Rio Dôce was certainly remarkable, as the only other coast regions of Brazil which could be compared to it were the boundaries of Maranhão with Pará, and the coastline north of the Amazons. Some of the causes of the neglect of these districts were common to all, namely, that as they were situated between, or by the side of, old routes to the interior, they had been less subject to settlement than were other regions possibly less favoured by nature. The Dôce valley had been at various times briefly examined by some of the old Brazilian pioneers, but as they found nothing to recommend it, except the productions of the virgin forest, and the way by water—as Mr. Steains had told them—only full of difficulties, what wonder was it therefore that this region should have been neglected, even when some of the most distant regions of Brazil were being populated? But those distant regions produced gold and diamonds—there they were, and no matter how great the distance, or how terrible the obstacles, there went that hardy race the old Portuguese pioneers of Brazil—now, alas! extinct. He believed that if it had not been for the irresistible attraction of this natural mineral wealth, the vast interior of Brazil would be to-day as wild and unpopulated as were these neglected regions of the Dôce. Yet one other cause had been hitherto operating as a deterrent to the population of the basin of the Dôce, and that was, that this region was the territory of the most fierce and savage race of the old Brazilian Indians, the Aymorés. Remarkable for their stature amidst all the other aboriginal races of Brazil, and conspicuous for their untameable ferocity, they utterly ruined and destroyed the works of some of the earliest colonists of Brazil, those on the coast of Espírito Santo; and long after all the coast tribes of Brazil had become scattered or amalgamated with the colonists, the Aymorés still maintained possession of their lands, and it was not until 1758 that the colonists called in the aid of a powerful semi-civilised race, the Corúados, by whose assistance the Aymorés were fairly driven away and were reported to have retreated to the distant regions of the Rio Mearim in Maranhão. In the province of Maranhão, he had seen some unusually tall Indians and of a type very different to the Mongolian type, common to most Indians. This made him believe that the actual Indian inhabitants of the Dôce were not Aymorés, but rather the remnants of other races who had sought these congenial wilds. Even the name of one of these tribes, the Nackinimpás, was very suggestive of Tupinimbás, a branch of the great Tupi nation who once occupied the districts near Rio de Janeiro, but who were as different in language, habits, and customs from the Aymorés as the ancient Britons were from the Saxons. Mr. Steains mentioned the Indians of the Dôce as one of the

existing obstacles to an occupation of this district. These wandering vagabonds might be, and doubtless were, a source of terror to the present timid, degenerate settlers of the Dôce, but if at any time serious attempts were made to develop this region the poor Indians would soon be swept aside, as had been the far more warlike wild races of other countries, before the irresistible advance of the white man. The whole of the upper basin of the Dôce was surrounded by populous regions, many of which constituted what were once called the Forbidden Districts, that is, reservations of the old colonial Portuguese Government, rich in gold and diamonds. Mr. Steains's voyage up the river had shown how difficult was such a route as a means of communication, and as the land was everywhere covered with a dense forest, it was quite easy to conceive how the old miners would much prefer the more roundabout, but easy, land-route to and from Rio and the mines, rather than the tedious way up the Dôce dominated as it then was by the fierce Aymorés. Two attempts at settling on the rich lands of the Dôce had been mentioned by Mr. Steains, both of which had ended in utter failure. Although he himself had already drawn attention to this region as an admirable field for colonising—if carried out in a practical way—he must say that all such attempts as Mr. Steains had described could not lead to anything but bitter disappointment, for without a ready communication to fair markets for their productions, how was it possible for a number of impecunious immigrants to do more than obtain a living? If they produced more than they required for themselves the surplus was only wasted, as they could not dispose of it at a profit where the transport to a market ate up everything, as it must do where a bag of salt cost ten times its value in Rio de Janeiro. Yet with all this, the poor disappointed settlers in this wilderness were really far better off than thousands and thousands of our own poor people at home, who, bred in poverty, battle through a weary, hopeless life, to end their days in the union or prison. In Brazil, in no part of the interior could any scheme of colonisation ever hope to be successful, unless the colonists were accompanied and supported by capitalists, who would provide them with the essentials of work and communications. He maintained that, as soon as the iron road threaded the wild interior of Brazil and opened up that bountiful land in a genial climate, there would then be no lack of immigrants. See what the iron road was doing for the Argentine Republic, and for São Paulo and Minas Geraes in Brazil. In the latter province, the Leopoldina railway penetrated an old neglected region, yet rich in a generous soil, and now, even with sleepy Brazilian countrymen to utilise it the change had been marvellous indeed. Railways first and colonists afterwards, should be the axiom of the Brazilian people, but never the reverse of this order of things, for otherwise the immigrants, devoid of any stimulus to work for more than their own necessities, would sink into the apathy of the country folk of internal Brazil and degenerate morally and physically as they had done. How could it be otherwise, where kind Nature repaid so bountifully the slightest exertion of man, and thus tempted him to a *dolce far niente* life in a land of perpetual summer? He did not see any reason whatever for anticipating an early settlement of the Dôce regions, for there were other districts of Brazil which would much sooner be made attractive to immigrants. One of these means was the extension of railways; another, was another possible golden era for Brazil; she enjoyed it once, when her sons swarmed over vast areas of the country, but natural difficulties and hordes of warlike Indians were then insurmountable obstacles to the exploration of what are yet virgin regions, rich in gold and diamonds. The difficulties and Indians no longer existed, and he quite anticipated that before long they would see gold doing for Brazil what it had done for Australasia, California and South Africa.—Mr. Steains had noticed that the people of Naque suffered from wens on their necks. This was doubtless

goitre, a most prevalent disease in the mountainous regions of Brazil as in Switzerland. It was evidently caused by some element in the water of the streams—lime, he believed—for he had often seen all the inhabitants of a valley suffering from the complaint, whereas those of an adjoining valley were quite free from it. He had never seen the complaint in any lowland region.—The Brazilian camarada is, in nine cases out of ten, a most excellent, useful, and faithful follower for any traveller in Brazil, and he could quite join with Mr. Steains in his appreciation of such good fellows as he met with.

In answer to a question by Mr. Bouverie Pusey, with regard to the danger incurred on account of the natives,

Mr. STEAINS said the natives did not show any hostility towards his little party. He treated them with confidence, and found they were open to good treatment. When his party were in great distress the natives could certainly have cut them off. They could have shot them all if they had wished, but they understand what kind treatment is, and they are grateful in their way, though they are not very demonstrative.

Mr. CHARLES NEATE said that fifty-four years ago an Englishman made an exceedingly valuable and elaborate reconnaissance of the Rio Dôce, and he (Mr. Neate) now held in his hands the plans that were then made. More than sixty years ago some gentlemen in England, he believed at Southampton, knowing the value of the river, from which considerable quantities of timber were exported, conceived the idea of sending out an expedition to colonise there, and an English engineer, the late Mr. Humphreys, was commissioned by them to make a survey. He did so in 1834, in the face of great difficulties. At his death he (Mr. Neate) was living at Rio, and the family placed the reconnaissance, which was a most valuable one, in his hands, and he would now like to place the charts in the Chairman's hands. Very few people in England, and perhaps nobody in Brazil, were aware of the existence of this reconnaissance. Mr. Humphreys was at least twelve months in the Dôce region. He measured the distance traversed by taking the length of the strokes of the canoe, and the number of strokes. He took all the angles, and a large number of soundings; the document was comparable with a military sketch map. The author of the paper had spoken of some American gentlemen from the Southern States who went to Brazil after the War of Secession with the intention of settling there. One of these gentlemen called upon him (Mr. Neate) at Rio, and said he wished very much to visit the Dôce. Mr. Humphreys' chart was lent to him, and he brought it back, after visiting the river, saying he was delighted with its accuracy. It was due to the memory of the late Mr. Humphreys, and might also be interesting to the Society, that this survey should be noticed.

In answer to a question by the Chairman, Mr. Neate said that the survey in his hands had not been published.*

The CHAIRMAN asked the meeting to pass a vote of thanks to Mr. Steains for his paper. They must all agree that it was a very interesting study of a very interesting subject. It had also elicited some very useful remarks from other gentlemen, not excluding the last speaker, who had brought to light the forgotten record of a former exploration in the same district, made by a gentleman whose name had not probably been heard at a meeting of the Society before. Mr. Steains had not only been a vigorous and successful explorer, but he was also a very skilful draughtsman, as might be seen from the specimens of his drawings on the table.

* The survey was confined to the main river.—[Ed.]

Notes on Demâvend.

By General A. HOUTUM-SCHINDLER, Persian Telegraph Service.

The Name.—The name of the highest peak of a mountain chain has often the same name as the chain itself, and we find that the Greek geographers considered Mount Jasonium to be the great chain of the Elburz, as well as its highest peak Demâvend. As a chain it extended from the Parachoatras towards the north-west, formed the connecting link between the Taurus and the spurs of the Anti-Taurus, and also extended from the Orontes to the Koronos.* Strabo calls it a great mountain, and places it "above the Caspian gates on the left hand" (that is to the north), this fixes it as the Demâvend;† with Ammianus Marcellinus the Jasonium is a mountain chain, comprising the present Elburz, Elvend, and the mountains between them.‡

The oldest mention of the name Demâvend is that by Moses Chorenensis,§ the name is there written Dembavend. The Bundahesh calls it Demâvend, Firdûsi Damâvend; Arab geographers Damâvend, Dabâvend, Dumbâvend; Persian lexicographers as above, and Dimâvend, Dimehâvend, Dibavend and Divâvend, and finally Zahir ed din says Duniâvend is the right form. For each of these forms there is an etymology; Duniâvend would mean the mountain on which the world, *dunyâ*, hangs; Dimehâvend and Dimâvend would be the mountain near Dimeh, a little town in the neighbourhood,|| often mis-spelt Wimeh; Divâvend and Dibâvend would relate to the imprisoning of Zohâk, the arch-div, in the mountain by Feridûn; Damâvend would mean the "mountain of winds," from Zend *dhmâ*, Persian *dam*, the wind; and, finally, Dabâvend, Denbâvend, and Dunbâvend, which I think the correct form, could be derived from Zend *dunma*, Persian *dûd*, smoke, and would mean the "mountain of smoke," referring to the mountain being a volcano.

Demâvend extinct or active?—We have no historical data regarding any eruption of Demâvend; we may, however, conclude from the myths of the Persians, that some volcanic action or another of Demâvend has

* The Taurus, i. e. "the mountain" (from the Aram. *tur*) are the mountains in Asia Minor extending east as far as Armenia; the chains joining them to the Caucasus form the Anti-Taurus; the Zagros and the Parachoatras run from the eastern end of the Taurus in a south-eastern direction to Fârs, and are the parallel chains of Kurdistan, Luristân, and Bakhtiârî; the Orontes, Greek transcription of Arvânt (Armenian Erovantuni) modern Elvend near Hamadân, is a part of the Parachoatras. The Koronos is the eastern part of the Elburz (the Tapyrian mountains of Polybius (lib. v.) north of Semnân. It is the Kâren Kûh of Zahir ed din ('Târikh i Mamâlik i Taberistân wa Rûyân wa Mâzandarân'), and had its name from the Kâren district of Dilem; the fortress Kâren was distant one day's march from Sâri (Idrisi).

† Cf. Ptol., vi. 2, 3, and 4; vi. 4, 1; Strabo, xi. 13.

‡ xxiii. 6, 28, 39.

§ Spiegel, 'Eran. Alterthumsk.' i. 70.

|| Şadiq Isfahânî, Abû'l Fedâ, Ulughbeg.

been observed in later times. The legend of Zohâk's imprisonment in Demâvend by Ferîdûn relates, perhaps, to the cessation of volcanic action. We need not however think of any real volcanic action, eruptions, &c., having been witnessed by former inhabitants of Persia, but only of occasional earthquakes, which, as we know, occurred in historical times.* The Arab geographers, Ibn Haukal, Istakhrî, Yaqût (citing 'Alî ibn Zeid and Mu'ser ibn Muhalhil), Zekerieh Kazvinî, Hamdullah Kazvinî, and others, speak of the smoke which comes out of the crater, or craters, on the summit. Thomas Herbert, who visited the hot springs on Demâvend in 1627, relates† that the summit was every night enveloped in fire (cf. Khondemîr's account, "at nights rays like sun-rays shoot out from the summit"). Dr. Olivier‡ also speaks of the smoke enveloping the summit, and Ouseley makes a similar remark. Kotschy, in 1843, also observed several columns of smoke, and describes the smoke as "not black, but whitish, like thick heavy steam."§ It is curious that the two careful observers, Chardin and della Valle, do not mention Demâvend at all. The latter passed the mountain several times.|| Dr. Tietze¶ concludes that the present volcanic action of Demâvend is restricted to the exhalation of steam, and that the mountain is a kind of solfatara.

The Altitude.—In spite of the many observations which have been taken, there are still doubts as to what the altitude of Demâvend really is. The old authors considered Demâvend the highest mountain in the world, and estimated its height at four to five farsakhs. Most of them say that no one can get up to its summit. Some, however, seem to have made an attempt to ascend it, ibn Muhalhil, for instance; others, like 'Alî ibn Zeid, sent some villagers up, and noted down what they said. In more modern times, Thomas Herbert was the first who visited Demâvend; he went up to the hot springs. It will, however, be well to divide the different altitudes into those obtained from barometrical observations and those obtained from trigonometrical observations.

Barometrical Observations.—1. The first ascent of which we have any succinct account is that by W. Taylour Thomson (the late Sir W. Taylour Thomson, H.M.'s Minister at the court of Persia), but his barometrical

* Tietze, 'Vulkan Demavend,' Vienna, 1878. † Paris edition, 1663, p. 306.

‡ Vol. v. p. 87, edition Paris, 1807. § 'Petermann's Mitth.,' 1859, p. 58.

|| Della Valle, on the 2nd February, 1618, camped at Mahalleh Bâgh, the present Khâr, on his way to Mâzandarân. Demâvend is plainly visible from Khâr, yet this is all Della Valle says of the mountains to the north: "Mahalleh Bâgh is situated at the end of a certain plain, at the foot of some mountains which go through the country and are, in my opinion, part of the high mountain chain which rises in Lycia and ends in China, having different names, as Taurus, Caucasus, Imaus, &c. The common names which the different authors, even the modern ones, give to these mountains, are unknown to the natives. This is no wonder, for first, it is very difficult to obtain reliable information about things so far off, and secondly there is no common name for these mountains; all the hills have different names, depending upon the towns and villages which are in their neighbourhood." (Amsterdam edition, 1666, vol. ii. p. 149.)

¶ l. c. 14.

observations were faulty.* Alexander v. Humboldt, correcting a probable clerical error in the observation of the barometer, calculated the altitude according to Oltmann's tables, and found it to be 2914 toises = 18,634 feet.†

2. Kotschy ascended Demâvend in 1843, and *estimated* its height at 14,000 feet.

3. Czernotta got to the top of it in 1852, but the results of his observations have not been published.

4. Mr. Ronald F. Thomson (now Sir Ronald, lately H.M.'s Minister at the court of Persia), Lord Schomberg H. Kerr (now the Marquis of Lothian), and M. de St. Quentin ascended Demâvend in 1858, and from their observations the altitude of 21,520 feet was calculated.‡

5. Dr. Brugsch took hypsometrical observations on the summit of Demâvend in August 1860.§ He observed for boiling-point in the cave a few feet below the summit, and observed temperature of boiling water $177\cdot3^{\circ}$, temperature of the air 41° . Calculating direct from this, and taking the mean barometrical pressure at the sea-level, and the mean temperature for August from isobaric and isothermal charts, I get an altitude of about 20,390 feet.

6. In 1862 de Fillipi took observations on Demâvend,|| and from his own, and from simultaneous observations taken at Ashûrâdeh, in the Gulf of Astrâbâd, calculated the altitude at 5670 metres = 18,603 feet.

7. Baron Call Rosenburg and Major the Hon. G. C. Napier ascended Demâvend on the 26th July, 1875.¶ Major Napier observed with boiling-point thermometer, which showed on the summit $179\cdot1^{\circ}$, the temperature of the air being 44° . I had observed at Teherân on the 4th July, and again on the 6th August, $205\cdot17^{\circ}$, 87° , and $205\cdot12^{\circ}$, 91° , and calculating with the mean of these and with Major Napier's observation, I get for the difference between the summit of Demâvend and Teherân 15,621 feet, which, plus the altitude of Teherân, 3811 feet, gives 19,432 feet for the absolute height of Demâvend; and calculating direct from the sea-level, taking mean barometric pressure and mean temperature from the charts, I get 19,218 feet; mean of the two results = 19,325 feet.

8. Major H. L. Wells, R.E., ascended Demâvend 6th August, 1881, and observed on the summit with mercurial barometer a pressure of 15·21 inches, and a temperature of the air of $71\cdot3^{\circ}$. The temperature

* "Account of Ascent of Demâvend, 1837," 'Journal R.G.S.,' 1838, p. 109-114.

† 'Kosmos,' ed. Berlin, 1877, vol. iv. p. 388.

‡ See 'Literary Gazette,' October 23, 1858, and 'Moniteur Universel,' December 7, 1858.

§ See 'Petermann's Mitth.,' 1861, p. 437, and 'Reise d. Preuss. Gesandtschaft n. Persien,' vol. i. p. 292.

|| 'Note di un viaggio in Persia, 1862,' Milano, 1865, p. 272; the late Colonel Sir J. Baleman Champain was one of the ascending party.

¶ See 'Mitth. der Geog. Ges. Wien,' 1876, p. 113, and 'Alpine Journal,' 1875.

of the barometer was not observed, the attached thermometer being broken. Calculated direct from sea-level this gives 19,400 feet.

The mean of the four reliable observations, numbers 5, 6, 7, 8, is 19,429 feet, very close to the results of Napier and Wells.

Trigonometrical Measurements.—1. The first trigonometrical measurement was that of the Russian Colonel Lemm, in 1839, but as he took the distance of Demâvend from Teherân, where he observed, to be 66 versts = $43\frac{1}{2}$ miles, which is too much, his result, which was 3141 toises, or 20,085 feet, ought to be less.*

2. The next was that of the Austrian Major Krziž, in 1853; he found the altitude to be about 20,000 feet.†

3. The next trigonometrical measurements were those of the Russian Lentz in 1860. He observed at Pâsangân (lat. $34^{\circ} 28' 30''$), and found the difference of height between his station and the summit of Demâvend to be 15,214 feet, and the altitude of Pâsangân being about 2750 feet (Lentz calculated it at 3266 feet), the altitude of Demâvend would be 17,964 feet. As the distance from Pâsangân to Demâvend is over 100 miles, the vertical angle was too small for any result of great accuracy. He observed again at Zergendeh, a village some miles north of Teherân, and found the difference of height to be 13,476 feet, which, added to the altitude of Zergendeh, gives 18,208 feet.

4. Of the Caspian survey measurements in 1862 I have no details, but the result given by Stebnitzky, 18,600 feet, is probably the same as that given by de Filippi, for he, as mentioned above, worked together with Russian observers at Ashurâdeh in the Astrâbâd Gulf. I fancy therefore that this result was arrived at by barometrical measurements.

5. Lieutenant Ivachtchinsef calculated the altitude from the Caspian Sea at Ashurâdeh at 18,550 feet, which, taking the Caspian to be 88 feet below the level of the ocean, would give for Demâvend an absolute height of 18,462 feet. Here again Ashurâdeh being about 100 miles away from Demâvend, the result is not of much value.

Lemm was a very careful observer, and taking the distance from Teherân to Demâvend at its true value, his angles would give about 19,200 feet. Lentz was a bad observer, and not much faith can be placed in his observations,‡ and his measurement from Zergendeh may be neglected; the other observations were taken at places too far away from the object observed, and I would therefore take the height of Demâvend to be very near the mean of the four reliable barometrical and Lemm's trigonometrical measurements, *about 19,400 feet.*

I may remark that mountaineering travellers and professional men like Dr. Tietze, of the Imperial Geological Institute at Vienna, the late

* See 'Notes to Map of Persia,' Major-General Stebnitzky, St. Petersburg, 1879, p. 91, and Humboldt's 'Kosmos,' ed. Berlin, 1877, vol. iv. p. 388.

† Polak, 'Wiener Abendpost,' January 10, 1877.

‡ St. John, 'Tables of Latitudes and Longitudes,' Dehra Dun, 1875.

Mr. Dietzsch, a mining engineer of twenty years' practice in South America, and Mr. Hübel, another mining engineer, many years at work in the Andes, have all estimated the height of Demâvend to be near 20,000 feet. It is a pity that the *five* gentlemen who ascended Demâvend this last summer did not take any observations, and that the others who took the trouble to get to the top and observed, did not arrange for simultaneous observations to be taken at Teherân.

Work of the Native Explorer M—H in Tibet and Nepal in 1885–86.

In April 1885 one of the explorers of the Indian Survey Department was directed to ascend the Dudhkosi river through Nepal, and thence to reach Dingri; he was thence to turn westwards, and find his way by Jonkhajong to Kirong, whence he was to travel further westwards till he reached Nubri, near the head-waters of the Buri Gunduk, and, following the course of the river, to return to India by Tirbenighat. This programme he succeeded in carrying out with a few unavoidable exceptions; but the want of hypsometrical observations (owing to an accident *en route* to the boiling-point thermometer) deprives his work of a place in the first rank of transfrontier explorations. His route, however, traverses more than 420 miles of new ground, and besides tracing the Dudhkosi to its source, it fills the gap between Dingri, Jonkhajong, and Kirong. Having received orders on the 12th April 1885 to arrange for his trip, the explorer went to Kumaun to engage companions and servants for the journey, and succeeded in engaging a Kumaun native and three Nepalese. He travelled in the disguise of a *baid* (physician), and having laid in a stock of European and native medicines, besides other articles suitable for presents to officials, he began his survey work at Dagmara thana in the Bhagalpur district. The first post was at Bhagalpur thana, and here after making presents, a passport was obtained, after which the party proceeded northward, crossing the Mahabharat range, and thence ascending the Dudhkosi still higher to Khumbujong, the residence of the governor of the Khumbu district, situated about 18 miles west of Mount Everest. This functionary absolutely refused the party permission to proceed northwards, alleging that the route had never been traversed by either Hindustani or Gurkha. The explorer made a lengthened stay here, treating the sick, among whom the commonest complaint was goitre. He succeeded in curing the governor's daughter-in-law of this disease, and thus secured the co-operation and company of her husband, Sunnam Durje, who, as luck would have it, was starting on a trading expedition to the north. The watershed of the Himalaya Mountains was passed a little distance north of a village called Pangji, beyond which the road leading up the gorge to the crest of the pass was extremely contracted, and took five or six

hours' toilsome marching to cross. Large masses of rock, brought down by snow action from the heights on either side, are to be met with in the valley, poised like capitals on pillars of frozen snow, about 30 or 40 feet in circumference, and 20 to 30 feet in height. The pass itself, called Pangula, is formidable, and estimated by him at 20,000 feet in height. The ridge or water-parting forms the boundary between Nepal and Tibet, and beyond, at the village of Deprak, more obstruction was experienced, till permission to advance was obtained from the Daibung, or governor of Dingri. The Dingri maidan or plain is where the pitched battle was fought between the Tibetans and Gurkhas in 1792. Dingri itself consists of 250 stone-built houses, inhabited chiefly by Tibetans. The altitude (13,860 feet) is excessive, and accounts for the rheumatism prevalent among the inhabitants. On an adjacent hill stands the stone-built fort occupied by the Daibung or governor, and forty Chinese military officers, who are in command of about 500 Tibetan soldiers. The authority of the governor extends from Shakra to the westernmost limits of Tibet, and he exercises both civil and military jurisdiction short of capital punishment within his territory. He has a monopoly of the trade in tea and salt, which the inhabitants are compelled to take over and pay for in barley and coin. The soldiers are armed with a sword, matchlock, and bow and arrows. The sword is the usual straight weapon, in wooden scabbard, met with all over Tibet; the matchlocks come from Lhasa, and the bows are made of bamboo brought from Nepal. The chief articles exported from India into Tibet by the Dingri route are tobacco leaf, cotton cloth, broadcloth, iron, brass and copper vessels, corals, and rupees, which are used for making jewelry. For these the men of Khumbu go annually in parties to India, some even as far as Calcutta, taking with them musk-pods, yak-tails, antelope horns, blankets, and stuffed *mundil* and argus pheasants. At Dingri further trouble was experienced in inducing the governor to believe that the explorer was really an inhabitant of Jumla, and to allow him to go home by the shortest way, via Jongkhajong and Nubri. The Daibung declared that this route was absolutely closed to all but officials, traders going westwards, and others being compelled either to take the southerly route via Nilam, or the northerly one across the Brahmaputra, through Dokthol (traversed by the Pundit Nain Singh in 1865-66). For a distance of about 25 miles beyond Chamda the valley shows abundant signs of having been once very largely populated, but it is said that in the last great war between the Nepalese and Tibetans, most of the inhabitants were killed, and the place now lies almost deserted. Having crossed the Lungola pass and traversed the Digurthanka plain beyond, the party reached the Palgucho lake, which is about nine miles by four in extent. The explorer was informed by his escort that this lake has no outlet; it appeared completely embayed by mountains, and the water was clear and sweet. Jonkhajong, a mud and stone fortress about 400 yards square,

was the extreme north-western point reached by the party; from hence roads lead north-west to Tadum, and west viâ the Satu Changbo to Nubri. Here the explorer bade farewell to his friend Sunnam Durje, to whose friendly offices he was indebted for having been enabled to proceed, and travelled southwards to Kirong. Beyond this village, near the Nepalese frontier, the road runs along a gallery of planks laid upon thick iron bolts driven into the face of the rock. The course of the Tirsuli river was followed to Naiakot whence M—H diverged westward and crossed the watershed between the Tirsuli and the Buri Gandak, the valley of which he ascended as far as Birjam or Nubri, after which he retraced his steps southwards to Arughat. Here he replied to official inquiries that he had gone all the way to Nubri, in search of one of his dependants who had run away from the explorer's house in Jumla with a large sum of money, but whom he (M—H) had not succeeded in finding. He said, having failed in his object, he was anxious to return home viâ Tirbeni, where he intended going through the customary religious observances. He was then allowed to proceed, but warned that owing to the disturbed state of the country consequent on the insurrection in Khatmandu he was liable to detention in several places. At the junction of the Tirsuli and the Buri Gandak rivers the explorer estimated that the body of water of the former was somewhat in excess of the latter and the current more rapid. The route then lay south-westerly, viâ Deoghat to Tirbenighat on the British frontier, which was reached on the 13th January, 1886.

GEOGRAPHICAL NOTES.

The proposed Antarctic Expedition.—An answer has been received to the letter,* addressed by our President to the Secretary of State for the Colonies, in support of the Australian request for a grant in aid of the proposed pioneer expedition to the Antarctic regions. As will be seen, Her Majesty's Treasury declines to promote the views of the Australian colonists, at least in their present form. The answer is conveyed in the following correspondence, a copy of which has been sent to the Society by the Colonial Office:—

COLONIAL OFFICE, DOWNING STREET, 12th December, 1887.

I am directed by the Secretary of State for the Colonies to transmit to you, to be laid before the Lords Commissioners of the Treasury, a copy of a letter from the Agent-General for Victoria, inquiring whether Her Majesty's Government will contribute the sum of 5000*l.*, in the event of the Australian Colonies making a like contribution, towards the cost of an Antarctic Exploration. Copies

* 'Proceedings,' 1887, p. 757.

of letters on the subject are also enclosed from the Admiralty, the Royal Colonial Institute, the Royal Geographical Society, and the Royal Society, which their Lordships will observe are all in favour of the co-operation of Her Majesty's Government in this work. A reference was also made to the Board of Trade, and it will be seen from the accompanying copy of their reply that in their opinion it does not appear necessary in the interests of trade that Her Majesty's Government should contribute towards the expense. The Board of Trade do not, however, seem to have regarded the probability of a considerable trade in sperm oil and other products of whale fishery arising in the future, or the importance of the expedition for scientific purposes, which it is believed would constitute the principal object of the expedition, and the value of which is strongly attested by the Royal Geographical Society, and the Royal Society. Sir H. Holland trusts their Lordships will give their favourable consideration to this application on behalf of the Government of Victoria, and consent to the contribution of the sum of 5000*l.* towards the scientific objects of the expedition. It would seem undesirable for Her Majesty's Government to take any direct share in the equipment or management of the expedition.

The Secretary to the Treasury.

I am, &c.,

JOHN BRAMSTON.

TREASURY CHAMBERS, 3rd January, 1888.

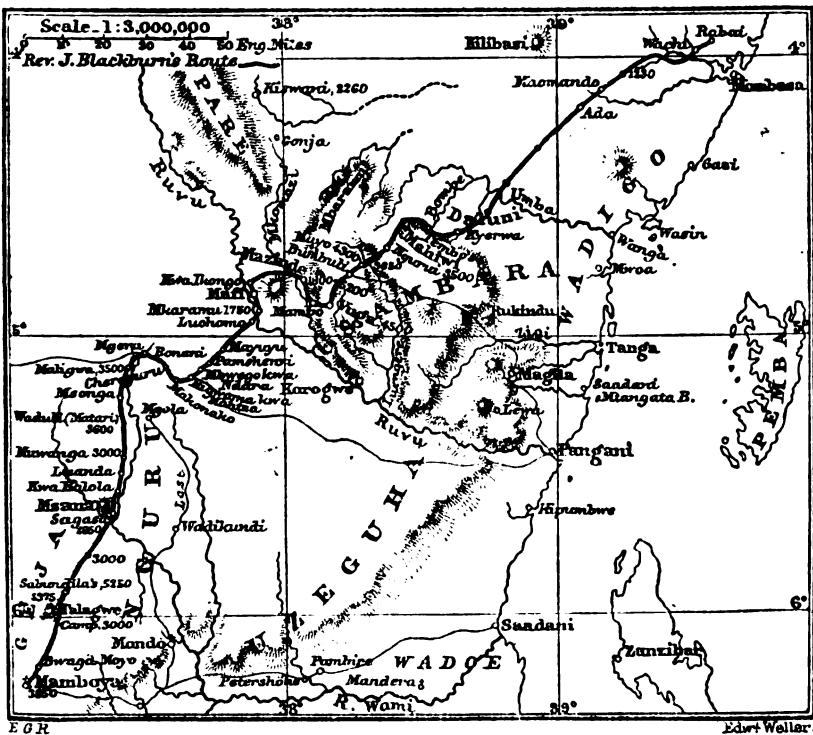
The Lords Commissioners of Her Majesty's Treasury request you to inform Secretary Sir Henry Holland that they have had before them Mr. Bramston's letter of the 12th ultimo, submitting for their favourable consideration an inquiry made by the Agent-General for Victoria, whether Her Majesty's Government would contribute 5000*l.* towards the cost of an expedition to explore the Antarctic regions, if such an expedition were undertaken by the Australian Colonies. The objects of this expedition would be (1) the promotion of trade and (2) scientific inquiry. But the Department best able to judge of the first does not think the interests involved sufficient to justify the proposed Imperial contribution; and the general result of the communications regarding the second object, received from scientific bodies, is to show that an expedition on the scale contemplated could do very little in the way of scientific investigation, and would have to be regarded simply as a pioneer of future more complete and costly expeditions. In view of this testimony, and of the many other pressing calls for Imperial aid which they have felt it necessary to refuse, My Lords do not feel that they would be warranted in asking Parliament to provide the proposed contribution. They arrive at this conclusion, however, with sincere regret, and would have been glad to have co-operated with the Australian Colonies in an enterprise having something more than a merely commercial purpose. Perhaps, however, My Lords may be allowed to regard the present proposal as an indication that if any like expedition be undertaken hereafter by the Imperial Government, some of the British Colonies more closely interested in it might not be unwilling to contribute towards its cost.

The Under Secretary of State,
Colonial Office.

C. G. BARRINGTON.

The Country between Mombasa and Mamboia, East Central Africa.
—In June to August last Bishop Parker and the Rev. J. Blackburn travelled overland from Mombasa to Mamboia, the latter place situated about 200 miles inland from the port of Saadani on the East African coast, near Zanzibar. This journey fills up another of the gaps which

have remained in our maps of the African interior, and is the more interesting as passing through one of the most varied, mountainous, and richly-wooded regions of the continent. The distance travelled was about 400 miles. The two travellers with a small party of native porters started on their long walk from Kisulutini, near Mombasa, on the 27th June. They crossed the Uмба river on the 6th July, and arrived at Daluni, in Usambara, on the 7th. Soon after they entered the lofty hilly region, the borders of which have been described by several travellers since the pioneer exploration of Captain (Sir R.) Burton in 1857. The country appears to be a succession of high ridges



and valleys, the first pass after leaving Daluni being 4700 feet above sea-level, and after a descent on the following day the travellers had another steep climb and camped at 5200 feet, the thermometer falling to 52° Fahr. Vuga (Captain Burton's Fuga), situated on a high hill, was reached soon afterwards. The river Ruvu was crossed, July 22nd, by a bridge used by the Zanzibar caravans, near the village of Luchomo, and the interior district of Nguru was entered on the 28th July. This hilly and well-watered region was traversed by Mr. Last and his wife six years previously, when peace and abundance reigned, and travelling was easy. In the interval raids of the plundering Masai had swept

through the valleys, and they were now nearly depopulated; the paths were overgrown with bushes, and where villages and plantations stood there was now nothing but jungle. The two travellers left Magera, in the north of the district, on the 28th of July, and reached Mamboia on the 5th of August. Bishop Parker concludes his account by saying that the route traversed was through a healthy and pretty region, with flowers in great variety and hill scenery, and that the people in the villages by the way were very friendly.

Count Pfeil's Journey through Useguha.—An account of the latest piece of exploration accomplished by this active German traveller is contributed by himself to the current number of Petermann's 'Mittheilungen.' The most valuable part of his work, which was accomplished in the spring of last year (18th March to 8th May), consists in his journey through a previously unexplored district of Useguha. The route from Pangani, his starting-point, along the left bank of the Rufu to Korogwe, is well known. The traveller was able, however, to correct Ravenstein's map in several particulars. About seven miles north-west of Korogwe the route crosses near Gereza the little river Mkomazi, which, on existing maps, is incorrectly shown as flowing through Lake Manga (should be Mangu) in a north and south direction; its point of confluence with the Rufu is also inaccurately given. The traveller followed this stream, which flows between two hill ranges in a north-north-easterly direction; it is only connected with the lake during the rainy season. The level of the lake and of the Mkomazi is much below that of the Rufu, but at Gereza they are equal. Before receiving the waters of the lake, the Mkomazi comes from the north, but the traveller was unable to trace it to its source. The vegetation on the south bank is dense, consisting of mimosas, euphorbias, cacti, &c., but the north shore is comparatively scantily clothed. The hill named Yermandia (native Mafi) on the right bank of the river should be placed nearer to the Rufu, and is not connected with the Vugiri chain, but is quite isolated. From Mafi the traveller paid a visit to Lake Mangu; he had, however, unexpectedly to curtail his stay there, because its waters were so strongly alkaline as to be unfit for drinking purposes, and the party suffered from thirst. The lake is about four miles in length, and a little less in width. Its yellow-green waters are of considerable depth, although it receives no tributary streams except the surface drainage from the surrounding hills. The vegetation on its shores is luxuriant, immense baobabs and lofty palms rise from the dense bush. Its surroundings are very picturesque, with hills in the distance. It is, however, rarely visited by the natives, and consequently game abounds. Having returned to Mafi he crossed the Rufu and struck due south across unexplored country to Mbuzini ($6^{\circ} 12' \text{ S. lat.}$). The route lay through a dry waterless region covered with steppe woods. Two dried-up water-courses were crossed, but no water met with until the village of Kiambo

was reached, more than 20 miles south of the Rufu; even here he was compelled to buy water from the natives. The latter are described by the traveller as peculiarly distrustful, greedy, and unprepossessing. They demanded payment for everything, even for answering a question. They appeared to have had unpleasant dealings with Arabs. One of the traveller's party who had gone out at night to look for water was missed, and although traced into the village nothing further could be heard of him. South of Kiambo the country gradually becomes more elevated, and, intercepting in consequence the moisture transported by the sea-breeze, it increases in fertility. Here and there it is well cultivated. Still further south the region becomes more hilly, especially to the west, where several ridges were seen running north-east to south-west, and some isolated peaks; to the east the country is more open. Several watercourses were crossed, of which the Mligazi, the most important, should empty itself into the ocean a little above Saadani. Between Ko Ludonga and Kwa Konde a fertile depression, with more rivers and some tree-growth, was traversed, and then Mbuzini was reached. The Bukagura, a tributary of the Wami, flows to the west of the town, not to the east, as shown on Ravenstein's map. From Mbuzini the traveller crossed the plains lying between the Wami and the Geringeri, where the soil is poor and water scarce, and following the course of the latter river down to its junction with the Kingani, he eventually arrived on the coast at Bagamoyo. Throughout his journey Count Pfeil paid special attention to the question of the composition of the soil and its value for cultivation, a subject he had previously studied. In the present paper he gives details as to the various kinds of surface-earth met with, and indicates the districts in which they are found, and their characteristic vegetation. The four kinds mentioned are — (1) the porous red earth, or the crumbled red gneiss, so common in Africa in its pure state; (2) the grey-red earth, or the red-earth mixed with various organic and other remains; (3) the black earth or alluvium; (4) the humus, resembling the black earth, but distinct from it in several particulars. The traveller has prepared a map of his route, but, inasmuch as his journey was made during the rainy season, and under a clouded heaven, he was unable to take many astronomical observations. However, by utilising the known latitudes of such central points as Mafi and Mbuzini, he has worked out substantially accurate results; his altitudes were determined by an aneroid and a boiling-point thermometer.

Exploration of the country between the Brahmaputra and the Upper Irawadi.—Mr. J. F. Needham has been engaged to conduct an expedition from Sadiya to the Hukeng valley, and thence to Bhamo on the Upper Irawadi. His previous achievements in the Abor Hills and the country lying between the Brahmaputra and the Zayal Chu, and his success in conciliating the unfriendly tribes of that frontier region marked him out for selection as the proper officer to conduct the present mission.

Before starting, he applied himself to the study of the language of the Singphos, the race which intervenes between Assam and Upper Burma, and in establishing friendly relations with influential chiefs of the tribe.

The Head-waters of the Orinoco.—At the meeting of the Geographical Society of Paris held on the 18th November last, M. Chaffanjon gave an account of his journey up the Orinoco. The object of the traveller was twofold—1st, to discover the sources of the Orinoco; 2nd, to study its connection with the basin of the Amazons by means of the Cassiquiari. After several stoppages at various towns on his way up the river, and a halt of some days at the mouth of the Cassiquiari, M. Chaffanjon found himself, after a six months' voyage, at Esmeralda ($65^{\circ} 5'$ W. long.) on 1st December. This point has long been known as the limit of definite exploration, although Michelena y Rójas is known to have ascended the river for some miles further, up to the junction of the Mavaca. Existing maps, however, of this part of the stream appear for the most part to have been laid down from native information, and M. Chaffanjon found them to be useless. The first affluent above Esmeralda is the Gabirima, which is on the left, not the right bank. At the mouth of this river the last hut of civilised Indians was seen. The main stream, which is here about 200 yards broad, winds considerably, and receives an immense volume of water from numerous deep tributary streams. Its steep banks, which are from 25 to 30 feet high, are composed of white and yellow clay. The vegetation is of the most luxuriant description; the trees are laden with orchids, and the vanilla blossoms scent the air. Here and there the famous *yuvilla* tree or Brazil nut was observed. The first important tributary is the Padamo, on the right bank, with a breadth equal to that of the main stream at this point (100 yards). Its waters, which are black and crystalline, are at least four feet in depth; the Maquiritares inhabiting its banks have some commercial intercourse with British Guiana. A little further on is the river Ocamo, another large tributary, also on the right bank. Two days later the party reached the Mavaca, the largest affluent on the left bank. At this point the traveller had great difficulty in getting the natives to proceed into the country of the dreaded Guaharibos, and only succeeded after threatening to use his revolver. The river here narrows to about 30 yards, and the banks, with forests dominating them, become steeper. Game abounds; troops of tapirs and peccaries disport themselves on the shores. The river flows at the foot of the Bocon hills, situated on the right bank, with an altitude of 2825 feet. A short distance further the stream passes at the base of the Guanayo range, the sides of which are deeply hollowed out by numerous torrents. Here and there clumps of trees in the clefts relieve this mass of black and wild rock. Another day's journey brought the traveller to the torrent of the Guaharibos, near the embouchure of the Rio Yéjéta, a

tributary of some importance. The stream forms a series of reservoirs in stages for a distance of from seven to eight miles, and is situated at the foot of a range which the traveller designated the Sierra Guaharibo. A recent encampment of the Guaharibos was discovered some distance up-stream in a clearing of the forest, where seven small huts were ranged in a circle. The latter seemed more suitable for dogs than human beings; they were roughly formed of five or six branches of trees bent over to form a cone. Around them were remains of Pará nuts which had evidently been bruised between two stones from the river-bed. Being unable to proceed further in his larger boat, the traveller left his companion (M. Morisot) with the men at this point, and in company with two natives continued his journey in a smaller boat. After five hours' travelling the Guaharibo range ceases abruptly, plains commence again, the stream having narrowed to about 15 yards. On the left bank there now appeared a peak 4850 feet high, forming the commencement of a chain running south-east. To this summit he gave the name Maunoir. Some distance beyond this point the traveller surprised a group of seven Guaharibos who, on his approach, fled with cries of terror into the forest. The traveller had several other opportunities of observing some of these natives, although not at close quarters. He describes them as of small and mean stature, with slender limbs, stomach inordinately distended, long and coarse hair, and bestial physiognomy. They were absolutely nude, and carried nothing but a stick. Their repast consisted of palm-shoots, a quantity of half-rotten fruit, and some little balls composed of crushed white ants. Some others to whom he exhibited at a distance pieces of cloth, knives, &c., fled away as soon as he attempted to get near them. After rowing several miles further the water becomes very shallow, and several more rapid streams were passed. On the left bank another summit, about 2100 feet high, was seen belonging to the above-mentioned range. The traveller then entered a vast marsh with muddy shallow water, the banks of the stream being now covered with aquatic grasses growing in deposits of soft whitish clay. Four hours were consumed in traversing this marsh, and then a high mountain range, visible to the south and east beyond the line of forests, was gradually approached with each bend of the stream, now only about five yards in breadth. He eventually arrived at a hollow about 35 yards in diameter, filled with large stones, and on the other side he followed the bed of a stream which led him into the mountains. Having satisfied himself that the source of the Orinoco was a mountain torrent springing from a peak (which he named Ferdinand de Lesseps) in the Sierra Parima range (3300 feet), he deemed it advisable to return with all speed, as he was unable to rely on the fidelity of his men. This was on the 18th December, the journey from Esmeralda having occupied eighteen days.—The remarkable bifurcation of the Orinoco by means of the Cassiquiari was also carefully studied by M. Chaffanjon,

and is thus explained by him. The latter river is at its outlet about 50 yards broad. The Orinoco here, as along most of its course, flows through clay and sand deposits. About two miles above this point the river rushes through a gorge only 90 yards wide, and the rapid current undermines the banks. The mass of clay deposits forming the left bank has a breadth of over $1\frac{1}{2}$ miles, with a slope towards the Amazonian basin. The origin of the channel by which a part of the waters of the Orinoco here flow into the Cassiquiari, and thence to the Rio Negro and the Amazons, was evidently brought about as follows. During the season of heavy rains the flood waters of the Orinoco overflowed the bank and ran down towards the Cassiquiari. At the same time the mass of water escaping from the gorge just mentioned constantly undermined the opposite bank (the river bends here), forming a kind of creek, while the upper current hollowed out from the upper part of the bank a trench. This gradually increased until a passage was formed for the waters of the Orinoco during the rainy season, which became in time a permanent channel. The outlet every year descends a few inches; it is now nearly half a mile from its original position. In entering the Cassiquiari the current has the same force as that of the Orinoco, but quickly increases in rapidity after traversing the clay deposits. From several considerations the traveller is convinced that this communication between the basin of the Orinoco and of the Amazons is recent. Among the other scientific results of M. Chaffanjon's exploration of eighteen months in this region we may mention the survey with the compass of the whole course of the Orinoco and the determination of its exact geographical position by means of more than 200 astronomical observations, the study of the manners, customs, and languages of the tribes inhabiting the basin of the river, and some valuable natural history collections.

Influence of Forests on Rainfall.—In last month's 'Proceedings' we referred to Mr. H. F. Blanford's conclusion on this important subject from a series of observations in India; he is inclined to believe that on the whole, forests do increase the rainfall. In the American journal 'Science' for January 6th, Professor Henry Gannett discusses the same subject from long and widely spread series of observations in three favourably placed regions in the United States. He points out first that the generally accepted belief is based on exceedingly scanty observations, and that of all meteorological phenomena, rainfall is the most difficult to observe precisely. The prairie region, including Iowa, Northern Missouri, Southern Minnesota, most of Illinois, and a small part of Indiana, has during the last thirty years undergone a great change with respect to vegetation. This great area of over 100,000 square miles, was, when settlement commenced, mainly grass-covered. It contained no forest. But man has encouraged the growth of trees, and the area of arborescent vegetation has been greatly increased. It is an example of reforesting

on an unusual scale. Has the rainfall correspondingly increased? No, Mr. Gannett declares, on what he believes to be trustworthy observations, ranging in different places from ten to forty years, it has on the contrary decreased. The early settlers in Ohio found it mainly a forest-covered region. It has been remorselessly cleared. This area of 40,000 square miles does not contain to-day a tithe of the timber-land that it contained fifty years ago. Has the rainfall diminished? No, Mr. Gannett tells us. From observations at twelve stations, ranging from ten to forty-eight years, which Mr. Gannett divides into two series, it is seen that the total rainfall of the first half of the series is slightly greater than that of the second half. Of course, he adds, the change is too small to have any meaning. Again, the States of Massachusetts, Rhode Island, and Connecticut, with adjacent parts of New York, New Hampshire, and Maine—an area of perhaps 25,000 square miles—were, when Europeans entered them, densely covered with forests. In time they were almost entirely cleared away. In recent years again, farms have been abandoned, the inhabitants have become massed in cities, and there has consequently been an enormous increase in the wooded area of these states. To-day, at least half of the area is again covered with woods. Summing up the results of observations during deforesting, and again during reforesting, Mr. Gannett shows that during the latter half of the deforesting period, down to 1860, there was a decided increase in rainfall, while dividing the period since 1860 into two halves, it is shown that the rainfall during each half was identical. "With these results in view, it seems idle," Mr. Gannett concludes, "to discuss further the influence of forests on rainfall from the economic point of view, as it is evidently too slight to be of the least practical importance." The moral seems rather to be that the subject is of so much practical importance that further extended series of observations should be undertaken wherever the circumstances are favourable, with the express purpose of testing the disputed point.

Reproduction of Ancient Maps.—MM. G. Marcel and J. Gaultier have submitted to us specimens of a work they are preparing, in which it is intended to give photographic reproductions of ancient maps, geographical manuscripts, and prints; one of the specimens is a map of the Agnese Atlas preserved in the Bibliothèque Nationale at Paris, and another, the Mappemonde of Jehan Cossin. The work will be published by Logerot, 55 Quai des Grands Augustins, Paris, in folio fasciculi, each fasciculus comprising five or six maps and accompanying text.

REPORT OF THE EVENING MEETINGS, SESSION 1887-8.

Fourth Meeting, 16th January, 1888.—The Hon. G. C. BRODRICK
in the Chair.

ELECTIONS.—*Thomas Joshua Alldridge, Esq.; Reginald Beech, Esq.; Colonel Sir Edward Bradford, K.C.S.I.; Henry Pearson Brocklesby, Esq.; Chief-Justice Fielding Clarke (Fiji); George Chilow, Esq.; Alexander Erskine, Esq.; Ernest Favence, Esq.; Alfred Ernest Lean, Esq.; Jos. White Todd, Esq.*

The paper read was :—

“Exploration of the Rio Dôce, Brazil.” By W. J. Steains, Esq. (*Ante*, p. 61.)

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris, November 18th, 1887: M. FERDINAND DE LESSEPS, President of the Society, in the Chair.—This meeting was held in the large Sorbonne Hall, and was devoted to a reception of M. J. Chaffanjon, who had recently returned to Paris after his explorations of the head-waters of the Orinoco. The Chairman, in opening the meeting, sketched the work of former French explorers in South America down to the present day, and welcomed M. Chaffanjon as the first European who had succeeded by dint of perseverance in visiting the region where the mighty Orinoco has its sources. M. Chaffanjon then gave a long account of his travels extending over 18 months on the Orinoco, in discharge of the mission with which he had been entrusted by the Minister of Public Instruction. He arrived in Venezuela in the spring of 1886 in company with M. Morisot, and on 10th June quitted Ciudad Bolivar on his expedition up the river. Caiçara was reached on the 22nd July, the latter portion of the voyage having been accomplished under considerable hardships. Here M. Morisot was attacked by brain-fever. The native inscriptions at Caiçara interested the traveller, and he made numerous copies. In consequence of the insalubrity of the place, which affected his own health also, he left Caiçara on 21st August and proceeded up-stream. On 12th September the party arrived at San Fernando, a town of 200 inhabitants, situated on a kind of peninsula formed by the Orinoco, the Guaviare, and the Atabapo. The party left San Fernando on 1st November, after having enjoyed the hospitality of the governor, M. Mirabal. Three days later they arrived at the Piedra Pintada, which are rocks rising from the middle of the river like obelisks; the base of these rocks was covered with figures and inscriptions, much more complicated than those copied lower down the river. The Indians stated that it was only during years of drought that the waters left them uncovered. On the left bank the Rio Ventuario empties itself by seven mouths into the Orinoco. The Maquiritares dwell on the left bank of the former river, while the Piaroas and the savage Macos inhabit the other bank. M. Chaffanjon made several attempts to get near some of these primitive natives, but they disappeared into the forest as soon as he approached. On the 6th November he arrived at the Quachapana, where he found a collection of native huts abandoned in consequence of an invasion of the *comejen*, a species of white ant, whose conical nests attain a height of five feet from the ground. The Rio Cunucunuma was ascended for four days, in order to get some Maquiritare Indians to accompany the party up the Orinoco, four men having deserted. M. Chaffanjon had an interview with the chief of this tribe, who treated him with scant courtesy until

a bottle of rum was produced: the effect was magical. The Cunucunuma has a breadth of 220 yards in its lower course and brings to the Orinoco a large volume of water. The torrential rains, descending the bare or scantily clothed sides of the mountains with great rapidity, produce in a few hours extensive inundations in all this district. This phenomenon is characteristic of all the affluents of the Upper Orinoco and accounts for the very considerable breadth of their courses. After this excursion, M. Chaffanjon resumed his voyage up the main stream and reached very shortly the embouchure of the Cassiquari on the left bank. Some days were spent here in order to study this remarkable bifurcation of the Orinoco. The next point of importance reached was Esmeralda, where he arrived at the end of November. The further journey up-stream to the peak, from which the Orinoco springs as a mountain torrent, occupied nearly three weeks. This part was over new ground entirely and must be regarded as the most important portion of the traveller's exploration. Some of the details given by M. Chaffanjon will be found above (p. 96), and therefore are omitted here. In conclusion the Chairman tendered to the traveller the thanks of the Society for his valuable paper.

—, December 2nd, 1887: M. JANSSEN, of the Institute, in the Chair.—Among the works presented, the General Secretary drew attention to M. Henry Binder's book on Kurdistan, which gives an account of the journey made two years ago by the author in company with M. E. Hamelin. The two travellers crossed Kurdistan to Lake Urumiah and Lake Van; then, after descending the Tigris to Baghdad, traversed Persia from west to east, and reached Teheran. From a geographical point of view, the results of this expedition are of considerable value. Existing maps of the region explored will have to be altered in several respects. Surveys with the compass were made of the valley of Djulamerg, and also of the route over the mountains between Djulamerg and Amadiah. Unfortunately, M. Binder was attacked and robbed a few days before arriving at Djulamerg, and in this way lost most of his topographical surveys. His book contains some valuable notes on the manners, customs, political and religious life of the Kurds.—M. H. Mager, author of the 'Colonial Atlas,' wrote to the effect that he was engaged in bringing out a new series of colonial maps, and requesting his colleagues to furnish him with any documents or information they might have on the French colonies.—A communication giving statistics as to the population of Copenhagen was received from M. Hønsen-Blangsted. The number of inhabitants, according to the census of 1st February, 1885, was 329,284, as against 273,918 in 1880, being an increase of over 11,000 a year. During the year ending 1st May, 1886, there were 10,803 births and 7201 deaths.—M. Paul Dufourcq forwarded a letter, dated 20th June, 1887, from M. Cholet, who writes from Loango. The traveller had been able to descend the Kuilu in a canoe from Ludima (confluence of the Niadi and the Ludima). As far as and after Makabana the river has a grand aspect. It is 650 yards broad, and the wooded islands with which it is studded give it the same appearance as the Congo. In the region of the Strauch Mountains the river becomes a torrent, rushing over a rocky bed. M. Cholet executed a survey of the course of the river, which the late Captain Pleigneur was supplementing at the time of his death. He suggests that at the Exhibition of 1889 French Congo should be represented by a working village, with its huts and industries. He would be happy to undertake the task of getting it together.—From Puerto-Cazado (Chaco) M. de Brettes communicated a copy of his report to the Minister of Public Instruction. He had just arrived at that town on 27th September; on the following day he intended to depart in order to traverse the unexplored region lying between him and Tarija (Bolivia).—The Chairman announced that the second general meeting for the year would be held on 16th December, under the presidency of M. F. de Lesseps, President of the Society. The annual report on the progress of

geography would be read, and M. Douls would give an account of his travels in the Sahara. On the following day the anniversary (66th) banquet would take place. The Chairman further stated that M. J. Martin was on the eve of departure for Russia, and that he intended, if possible, to undertake another journey into Siberia.—Among the works laid on the table were the following:—one entitled ‘*Luçon et Palawan*,’ by M. A. Marche, giving an account of the voyages made by him in that archipelago during the last six years; an important work by M. Levasseur, dealing with the statistics of the superficial area and population of the countries of the world; and a naval meteorological atlas by M. L. Teisserenc de Bort, who at the same time presented the *résumés* of seventeen geographical positions determined by him in the course of his scientific missions in Algerian and Tunisian Sahara and in the south of Tunis.—In conclusion, M. Hamy communicated to the Society some of the principal episodes in the excursion which he undertook in company with M. E. de la Croix into the mountains to the south-west of Gabes, in the course of the scientific mission with which he was entrusted by the Minister of Public Instruction. The mission was not, properly speaking, geographical, M. Hamy’s chief object being to study the so-called “dolmens” of this district, but he was able to gather much new information about the region traversed, which will be useful to geographers, while his companion devoted himself to the study of the natural history and geology of the country. M. Hamy’s researches lead him to the conclusion that the pseudo-dolmens are only funeral monuments belonging to towns similar to some visited by him, which existed anterior to the Roman epoch and the geographical distribution of which he will be able to determine in a great measure.

— December 16th, 1887: M. FERDINAND DE LESSEPS, President of the Society, in the Chair.—The following were among those on the platform:—M. Bouquet de la Grye, of the Institute, Vice-President of the Society, M. W. Huber, Dr. Hamy, M. H. Duveyrier, Vicomte A. de Faria, Portuguese Consul at Paris, M. Capus, and Dr. Neis.—The Chairman opened the proceedings with a brief speech, in which he commented upon the rapid progress which geography had made in recent years; this was due in great measure to improved means of communication. While referring to the Trans-Caspian railway now making such rapid strides under the superintendence of General Annenkof, he expressed the hope that the Trans-Saharan railway and also that proposed from the Senegal to the Niger might be carried out.—M. Maunoir, the General Secretary, then read the principal passages in his annual report on the operations of the Society and on the progress of geographical science during the year.—The Chairman afterwards called upon M. Camille Douls to give an account of his journey in Western Sahara. Early in 1887 he landed on the coast of the Sahara near Cape Garnet, in the disguise of a Mussulman, but soon fell into the hands of the marauding Ulad-Delim, who put him in chains. He was eventually released and admitted as a brother in the tribe. For five months he wandered over unexplored country in company with these nomads and with his instruments was able to survey the route. The extreme points of his itinerary were the Tropic and Djuf, the great depression of the Sahara, to the south-east, and the sebka of Zemmur to the east. Returning to the coast he ascended from Cape Bojador to the mouth of the Saguia-el-amra. He then proceeded eastwards and reached Tinduf, the great slave dépôt. From this oasis he returned to Cape Juby across Tekna, and finally entered South Morocco by traversing Uad-Draâh. He was eventually made prisoner by the Sultan at the city of Morocco, but released on the representations of the English Minister. M. Douls intends in a few weeks to return to the Sahara; his object will be to utilise his knowledge of the language and of the country in order to explore a fresh part of the great desert. His paper will be inserted in the Quarterly Bulletin.

Geographical Society of Berlin, January 7th, 1888 : Baron VON RICHTHOFEN in the Chair.—This meeting, being the first of the new year, the Chairman reviewed the development of the Society during recent years. The Society now numbers 990 ordinary members. The Chairman also made a statement to the effect that the “*Africanische Gesellschaft in Deutschland*” had been dissolved, as its task of exploring the great blank in our maps of the interior of Africa was ended, because the continent had been divided between different European Powers, and each of these Powers might be left to grapple with the exploration of its own portion. Thus the Imperial Government of Germany had taken in hand the exploration of the German Protectorate, and the African Society, inasmuch as no further pecuniary means were at its disposal, was unable to reconstitute itself and devote itself to new objects.—Prof. Kiepert then made some observations with reference to certain new maps, viz., one of Greece, by J. Kokides, one of Cappadocia and Cilicia, by J. R. S. Sterrett, &c.—Dr. von Luschan then spoke upon his several journeys in Asia Minor. Lycia, famous on account of its great funeral monuments, gigantic rock-graves and sarcophagi, has, since the enthusiasm, kindled in 1840 by the German schoolmaster Schönborn, cooled down with the death of the latter, almost sunk into oblivion. Otto Bennardorf, in whose first expedition (1881) the speaker took part, was the first to arouse again the desire for a thorough exploration of these regions. The Austrian Government then despatched an expedition in 1881-2, which recognised the discovery made by Schönborn, in the hilly country of Lycia, north of Kekowa, of a frieze nearly 220 yards long, with representations from the *Iliad*, to be a work belonging to the best Grecian period. Then from Berlin followed the speaker's journey undertaken with the object of pursuing the great discovery which Otto Pudestein had made in 1882. The latter had found on the right bank of the Upper Euphrates, midway on the line between Iskenderun and Bagdad, and situated on the peak Nemrud Dagħ (7000 feet), an immense tumulus, ingeniously constructed, which contained the ashes of Antiochus I., and which was flanked on the east and west by five gigantic images of gods from 16 to 23 feet high. A long, well-preserved Greek inscription on the back of the throne-seat set forth the deeds of the great King Antiochus Epiphanes. This memorial of antique greatness will doubtless soon be the goal of numerous tourist trips, as has already been the case with Palmyra, Sardis, Troas, and Ephesus. At a distance of ten days' journey from the coast, and in the midst of an incomparably beautiful landscape, the traveller along this route comes upon the ancient bridge over the Boğlam-Su, with its single span, 65 feet in height and 325 feet in length. This bridge was built by the Emperor, Septimius Severus, Caracalla and Geta, and is to-day in such a complete state of preservation that the whole trade of the province is accommodated by it, while an iron bridge over the Nahr Afrin, built by the Turkish Government in 1882 at enormous cost, and opened with a great flourish of trumpets, was swept clean away by the next winter flood. The speaker afterwards took part in the two expeditions of Count Lanckorowski, the object of which was the archaeological exploration of Pamphilia and Cilicia. In certain other and later journeys undertaken at his own cost, Dr. von Luschan turned his attention especially to the extremely complicated ethnographical conditions of Asia Minor, which it is asserted cannot be altogether unravelled. The following eight groups, which have immigrated within recent or comparatively modern times, may, either on account of their numerical unimportance or because they keep themselves physically isolated, be ignored in connection with the study of the ancient history of the population:—The groups are the Cherkesse, Franks (Europeans), Arnauts, Bulgarians, Indians, Arabs, gipsies, and negroes. Only the Arnauts and Bulgarians might, if the immigration continues, disturb in time the existing type. The subject of the Kurds, Turcomans,

and Iürükes, dwelling in the country as genuine or half nomads, is a more difficult one. The Kurds of Asia Minor have been best described by v. Moltke; they have particularly long skulls, while the Kurds of Persia have decidedly short skulls. They form in any case an anthropologically independent group, in the same way as the Turcomans, who have a distinctly Mongolian appearance, although our historical knowledge as to their first appearance is still very deficient. The Iürükes are genuine nomads, whose traditions point to an original home in the Northern Hindu Kush. They have a custom peculiar to themselves of deliberately deforming the heads of their children by binding them round with wet cloths. To this group a series of very mysterious tribes belong, viz., the Tachtadschy or Allevi in Lycia, the Fellach or Ansarieh in North Syria and in South-east Asia Minor, and the Kizilbash and Tezyde in Upper Mesopotamia and Western Kurdistan. There appears to have existed between these tribes an ancient pre-Mohammedan connection, and among them there seem to be the remains of a pre-historic people. The study of this question is one of the most promising in connection with the ethnography of Asia Minor. In the country a large number of fables are current with reference to this race; the people ascribe to it the greatest vices; for instance, in connection with the religious assemblies, when vile orgies are said to have been practised, while as a matter of fact the same remain confined to the conjurings of hypnotic and hallucinatory mental conditions. These tribes appear to have a code of good and bad principles. The peacock is the embodiment of the latter. The transmigration of souls is a further feature in their esoteric doctrines. It is their common practice to raise their drinking vessels to the mouth with both hands. They have a preference for certain names, such as Ali, Mehmed, Hauan; and an aversion to names like Omar, Osman, Bekir. The anthropological measurements fully confirm the close connection between these mysterious tribes. They all have extremely high and broad skulls. The Armenians, Greeks, and Turks belong to the three largest tribal groups of Asia Minor. The Armenians are a compact and an anatomically, ethnically, and linguistically homogeneous people. They have inhabited their hill regions from time immemorial, and must be regarded as descendants of an old aboriginal population of Asia Minor. Their very striking anatomical affinity with the Tachtadschy, Kizilbash, &c., and with peoples from whom they now stand so far apart, is peculiar. The Greeks of Asia Minor along the west coast and on the islands may be considered to be descendants of the old Hellenes—at least there exists in those regions a large number of individuals of the old-Greek type; but in the interior, south and north, at least one-half of the Greek population present the physical characteristics of the Armenians. A third group of Greeks on the south coast exhibits a distinctly Semitic type, which is confirmed also by anatomical examination, by names of places of Semitic origin, and by isolated inscriptions, &c. The Turks, however, who constitute the great bulk of the population of Asia Minor, form, it is true, a religious and linguistic unity, but a multiplicity of anatomical types, among which the Turcomanian-Mongolian, which one might most naturally suppose to be present, is almost completely absent. Among them, however, or perhaps it would be more correct to say, among the followers of Islam in Asia Minor, three types, just as among the Greeks, are to be found, viz. the Armenian, old-Grecian, and Semitic. This circumstance consequently shows that the Turkish conquerors have left the impress of their religion and language on the earlier inhabitants of the country, but were numerically too weak to influence in addition the physical nature of the conquered.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KULTIE, *Librarian R.G.S.*)

EUROPE.

Brown, Jno. Allen.—*Palæolithic Man in N.W. Middlesex.* London, Macmillan and Co., 1887: 8vo., pp. iii. and 227. Price 7s. 6d. [Presented by the Publishers.]

Mr. Brown's interesting book is intended to present the evidence of the existence of palæolithic man and the physical condition under which he lived in Ealing and its neighbourhood, illustrated by the condition and culture presented by certain existing savages. The book is a useful and well-sifted collection of evidence bearing on an interesting subject, and contains sketches of the very different geographical conditions of the London district in these remote times from those which we find now.

Caruso, C. D.—*Notice sur les Cartes Topographiques de l'État-Major Général d'Autriche-Hongrie.* Genève, Shuchardt, 1887. [Presented by the Author.]

M. Caruso obtained permission in 1886 to undertake researches in the Austrian Military Geographical Institute as also in the Archives of the War Office, and has thus been able to bring together a great variety of data of geographical interest. In the present brochure he studies the subject of the Austrian staff-maps, following through their principal phases the development of the form of the maps from their origin to the present time, taking account of the special conditions of each epoch.

Kerner Von Marilaun, Fritz [Bitter].—*Untersuchungen über die Schneegrenze im Gebiete des Mittleren Innthales.* Wien, 1887: 4to., pp. 62.

Radde, Dr. Gustav.—*Ornitologicheskaya fauna Kavkasza (Ornis Caucasica).* The Ornithological fauna of the Caucasus, a systematic and biologico-geographical description of Caucasian birds. Tiflis, 1884: 4to., pp. 450, 26 plates and map. [Presented by the Author.]

This work was first undertaken in 1877 at the instance of the Grand Duke Nikolai Mikhailovitch, to whom it is dedicated. An amusing account is given in the introduction of a preliminary interview between the author and his patron, and of the order promptly wired to Mr. Quaritch for all the works of reference required. Dr. Radde's own observations, carried on in the midst of his multifarious duties as director of the Tiflis museum and on his several journeys in Caucasia, were the foundation of his book, while his collection of birds numbering no fewer than 4400 specimens, besides 700 skins received from Europe for purposes of comparison, afforded him an abundance of material.

Dr. Radde's system differs from that of modern ornithologists, with whom he disagrees. Instead of forming new species in the case of birds which differ only slightly in the colour of their plumage and in size, he groups them all together in one species, indicating merely the varieties, these being dependent in a great measure on circumstances, such as time, place, and age. According to our author the limits of any one species are determinable by the extreme forms taken by a whole series of individual specimens, uniting these extremes by every variety in colour or size. This view has been adopted by him in all his works on botany and zoology.

After his introductory remarks, Dr. Radde gives an explanation of the plates at the end of the book, a list of all kinds of birds seen and collected in the Caucasus and its neighbouring seas, with brief remarks on their horizontal and vertical distribution, on their time of flight and brooding. This list, comprising 4106 specimens, grouped into 367 species, and 66 varieties, is followed by the detailed description of each species. Besides the Latin and Russian name, Dr. Radde gives the native equivalents, whenever there happen to be any, in Persiau, Tartar, Georgian, Talish, Armenian, and Arabic.

In order to lend more force to his remarks on the dependence of bird life

upon physical conditions and topography, Dr. Radde presents us with a physico-geographical sketch of Caucasasia. He reviews its orography, distinguishing between the Great Caucasus and the lesser or anti-Caucasus chain to the south, shows the connection between the two, and describes the rivers they give birth to. He gives a general panoramic impression produced on him by the main range when seen from a height south of the Kur (Cyrus), and adds a table of heights, with the latitude and longitude of every peak (the longitude unhappily reckoned from Ferro). He also has a good deal to tell us about the Armenian plateau and the Talysh mountains, with which his previous works have acquainted us.

The feature in the map is the indication by lines drawn across the Black Sea of the direction taken by migratory birds in passing from Europe to Asia and *vice versâ*. The localities where certain genera of birds predominate are shown in colours and type.—[E. D. M.]

Roth, [Dr.] Samuel.—Die Seen der Hohen Tâtra. Bulletin de la Société Hongroise de Géographie, 9–10. Numero. Budapest, 1887.

There are 115 lakes, mostly small, in the Upper Tatra, 78 being on the south side and 37 on the north side. Dr. Roth gives here a careful résumé of what is known about them.

Wolf, Julius, und Luksch, Josef.—Physikalische Untersuchungen in der Adria. Wien, 1887: 8vo., pp. 22.

ASIA.

Cochran, William.—Pen and Pencil in Asia Minor; or, Notes from the Levant. London, Sampson Low & Co., 1887: 8vo., pp. xxiv. and 464, illustrations. Price 21s. [Presented by the Publishers.]

The materials for the present volume were gathered during the author's investigations on the subject of whether silk and tea could be produced in one or other of the British possessions. A large portion of the volume is devoted to the subject of Sericulture, and to the author's own observations whilst witnessing an entire silk harvest at Bournabat, near Smyrna. The opening chapters describe the voyage out from England; others deal with Smyrna and its neighbourhood, including its Greek institutions, agriculture, fraudulent insurers in Smyrna, the Smyrna and Aidin Railway, &c.; chapter xviii. is descriptive of a visit to Hierapolis and Laodicea; in chapter xx. the author gives impressions of a trip from Smyrna to Constantinople; others contain an account of his trip up the Bosphorus and return to Constantinople and Smyrna; chapter xxvii. deals with the sites of the Apocalyptic Churches; the concluding chapters describe the return voyage to Liverpool. There are numerous illustrations, many of which are engraved from the author's own sketches.

Heyfelder, [Dr.] O.—Transkaspien und seine Eisenbahn. Hannover, 1888: pp. viii. and 159. Price 8s.

The author, surgeon-general to the Russian forces in the campaign against the Tekkeh-Turkomans in 1880, has made good use of his opportunities for studying the position of Russia in the Trans-Caspian region and the great part likely to be played by the military railroad to Merv, Bokhara, and Samarkand, not only in facilitating access to these regions, but in revolutionising the manners and customs of the inhabitants in the mutual interests of natives and Russians. Nothing is more civilising than a railroad, and the mere fact of this line having been constructed ostensibly for strategical purposes cannot in the end interfere with its international character, more particularly as this strategical railway nearly coincides with the ancient trade route across Central Asia.

The first chapter is devoted to a sketch of the topography of the Trans-Caspian region, compiled from the best authorities, with some sensible suggestions by the author himself as to due economy in utilising water, and in planting trees as a means of improving the climate and checking the advance of the

sand. We doubt, however, whether these suggestions will be carried out, as the Russians are careless of hygienic works not immediately concerning utilitarian purposes. In the third chapter a comparison is drawn between the relative positions of England and Russia, especially with regard to their respective military systems. The whole question, remarks Dr. Heyfelder, is how far can England depend on her Indian allies and her native troops. Russia abstains from forming a native army, and does not care to provide them with good arms, quite a contrary system to ours in India. We may perhaps remark that the author's reflections as to whether a mutiny of well-disciplined troops is more formidable than an insurrection *en masse* of an exasperated population fighting single-handed behind rocks and trees, are open to doubt. But upon the whole the author, whose German nationality prevents him from taking an altogether Russian bias, is tolerably impartial in his appreciation of the present state of things in those countries. There are some woodcuts, and a useful map of the railway, giving the distances and name of every station between Uzun-ada, its terminus on the Caspian, and Samarkand.

The concluding part is a narrative of the construction of the railroad from its commencement at Uzun-ada, in Mikhailofsk Bay, where some praise is lavished on the character and energy of the well-known General Annenkov, principal constructor of the line.—[E. D. M.]

Schroeter, H.—Bericht über eine Reise nach Kwang-Si im Herbst 1886 unternommen. Hongkong, 1887: 8vo., pp. 97.

— The Trade of the Province of Kwang-Si and of the City of Woo-Chow-foo. Canton, 1887: 8vo., pp. 20.

The latter pamphlet is a translation of the appendix to the narrative.

Schumacher, G.—The Jaulán. Surveyed by G. Schumacher, C.R. London, Beasley & Son, 1888: 8vo., pp. 1-127.

This appears as an appendix to the Quarterly Statement of the Palestine Exploration Fund for January, and is not completed. It is a translation (though not indicated to be such) from 'Der Dscholan,' noticed in the 'Proceedings' for 1887, p. 317. The Society has done well to make Herr Schumacher's study accessible to those who do not read German.

AFRICA.

Baumann, Oscar.—Beiträge zur Ethnographie des Congo. Mit 31 Illustrationen von Ignaz Spöttl nach Originalskizzen und selbst gesammelten Objecten des Verfassers. Wien, Im Selbstverlage des Verfassers, 1887: 4to., pp. 22. [Presented by the Author.]

[**Cape of Good Hope.**]—Ministerial Department of Native Affairs. Blue-Books on Native Affairs. 1880; 1881; 1882, Vol. I., Parts I. and II.; 1883; 1884; 1885; 1886; and 1887. Cape Town, 1880-1887: folio, maps. [Presented by the Government of the Cape of Good Hope.]

Chippindall, [Lieut.] W. W.—Observations taken by Lieut. W. W. Chippindall, R.E., on the White Nile in 1875. [MS.] Folio, pp. 8. [Presented by Lieut. Chippindall.]

Graham, Alexander, and Ashbee, H. S.—Travels in Tunisia, with a Glossary, a Map, a Bibliography, and fifty Illustrations. London, Dulau & Co., 1887. Price 25s. [Presented by the Authors.]

This is a volume of original value. It is the result of three distinct visits to Tunisia—in the winter of 1883 and in the early spring and winter of 1885. The authors have not sought to write a popular volume, and have therefore abstained from introducing any padding. They have described nothing they have not seen, and as in certain directions the authors are well-

qualified observers, their work is a substantial contribution to our knowledge of Tunisia. They bear high testimony to the excellent results which have followed the French occupation; good order and a feeling of perfect security prevail in every part of the Regency. While the authors deal mainly with the archaeological and architectural features of the country, there is much useful geographical information. Three chapters are devoted to the city of Tunis, and as the illustrations are numerous, carefully executed, and rigidly accurate, an excellent idea of the various features of the city, architectural and social, is conveyed. The authors succeeded in covering a really large extent of ground. Not only were many places on the north and east coasts visited, but they went right into the heart of the country, as far south as Kassim. Kairwan, of course, is dealt with at some length, and exhibited in several new aspects. A chapter is devoted to domestic life, and the Bibliography, covering seventy-six pages in double columns, seems almost exhaustive. The really beautiful illustrations, tinted and photographic, are themselves of a highly instructive character, and the work altogether is a model of its kind.

AMERICA.

Doering, Oscar.—*La variabilidad interdiurna de la Temperatura en algunos puntos de la República Argentina y de America del Sur en general.* IV.—*Variabilidad de la Temperatura en Concordia.* Buenos Aires, Imp. de Pablo E. Coni é Hijos, 1887.

Froude, James Anthony.—*The English in the West Indies; or the Bow of Ulysses.* London, Longmans & Co., 1888: 8vo., pp. x. and 373. Price 18s. [Presented by the Publisher.]

The want of an index and a map to Mr. Froude's new book may be taken as indicative of the absence of detailed geographical information. The book does not profess to be informative; Mr. Froude visited the West Indies, he tells us, in order to increase his acquaintance with the condition of the British Colonies. "I have related what I saw and what I know, with the general impression which I was led to form." Taking it all together, Mr. Froude did not see much of the islands themselves, and the people he came in contact with were mainly officials. His view of the present and future of our West Indian Colonies is nearly as bad as it could be. They have not recovered from the blow inflicted by the abolition of slavery, and of the negro Mr. Froude's opinion is distinctly Carlylian. One lesson of the recent collapse of the sugar industry surely is that the islands should be utilised for the many other cultures for which they are so well adapted. Mr. Froude's book is certainly readable and suggestive. There are several good illustrations from his own sketches.

Güssfeldt, Paul.—*Reise in den Andes von Chile und Argentinien.* With one general and two special maps. Berlin, 1888: pp. xv. and 480. [Presented by the Author.]

Dr. Güssfeldt had previously done mountaineering and exploring work in the European Alps and in Western Equatorial Africa, when inspired by the example of his renowned countryman, Alexander von Humboldt, and the more recent travels of Messrs. Reiss and Stübel in the Bolivian Andes, he determined to emulate their labours. The part of the chain selected by Dr. Güssfeldt for his explorations lies between 32° and 35° S. lat. where this great chain, the "Cordilleras" of the Spaniards, forms the boundary between Chili and the Argentine Republic. After a six weeks' voyage from Liverpool, touching at Rio de Janeiro and passing through the Straits of Magellan, Dr. Güssfeldt landed at Valparaiso (from *paraiso*, Spanish for paradise), whence a five hours' journey by railroad brought him to Santiago, the capital of Chili. To the singular beauty of its situation and scenery he does justice, and has a good word for the Chilians, who showed him much hospitality, though his admiration for their fine qualities is mingled with regret that they have become so excessively self-confident and boastful since their successful war against Peru.

Some visits to *haciendas*, or large landed estates, gave him opportunities of observing the country and its people, and the hacienda de Cauquenes became the starting-point of his several expeditions into the mountains. It was here that on the 6th December, 1882, our author observed the transit of Venus across the sun's disc, with no better instrument than the telescope of his theodolite. Two days later, on the 8th of that month, he started from Baños de Cauquenes with three Chilians and mules to carry the party and their baggage, &c. His first excursion was a preliminary one up the Cypress Valley to Agua de la Vida, the ride to which may be compared with that from Vispach to Zermatt, only that the American journey is rather the longer of the two. The upper end of the Cypress valley is blocked by a glacier (named by our author the Ada glacier), and above it rise lofty mountains, one of which he named the Dent Blanche of Agua de la Vida. Having returned to Cauquenes, Dr. Güssfeldt started on his second expedition—to the Maipo valley. He ascended the Cachapual and then the Cajon de la Lena, crossed the watershed of the main, western, chain of the cordilleras by a pass 13,471 feet high, and descended the Atlantic slope by the head-waters of the Rio Diamante to within a few hours' ride of the Cerrito del Diamante, an isolated volcano reminding him of Vesuvius. He now turned northwards and crossed the Pampas to the *estancia*, or cattle ranch of Yaucha, where he halted for a couple of days. Then he recrossed the Andes by the Maipo pass, bivouacking at the foot of the Maipo volcano, and devoted four days to the successful ascent of its summit as well as to a trigonometrical survey of this mountain. Re-entering Chili by the Maipo valley, Dr. Güssfeldt again returned to Cauquenes, and prepared for the more formidable task he had set himself to accomplish, that of scaling Aconcagua, the highest peak of the Chilian Andes. Approaching its base from the north by the Rio Putaendo and the Valle Penitente, he formed his bivouac at 16,391 feet above sea-level, whence he had an uninterrupted view of the mountain from its base to the summit. At noon on the 20th February, 1883, the definite ascent began. The party were able to ride till 4 p.m. to a point reached on the previous day's reconnaissance. Here the mules were left, and at 9.30 p.m. Dr. Güssfeldt, accompanied by two Chilians, started on foot. A full moon lighted up the scene and enabled them to direct their march by night over ice and snow-field to the base of the mountain mass, which they reached at 2 a.m. on the 21st. Here the ascent in the strict sense of the word began. The cold was intense, and the sufferings of the Chilians proportionately great, though they were provided with every kind of warm clothing. At 10 a.m. one of the Chilians had both his feet frozen, and could go no farther. Dr. Güssfeldt and his one remaining companion pressed on till within 1000 feet of the summit, when they were compelled to retreat by thick weather, after experiencing great discomfort from the rarefaction of the atmosphere. A second attempt made on the 5th March was equally unsuccessful. Our traveller brought his explorations to a close by an excursion over the Cumbre pass, 12,369 feet, riding from Santa Rosa de los Andes in Chili to the Argentine Baños del Inca, along the highway over the Andes leading to Mendoza, a route described by previous travellers, and notably by MacRae.

The appendices to his book contain his scientific observations, including longitudes by time differences from the meridian of Santiago, barometrical heights, trigonometrical measurements of heights and distances, including the elevation of Aconcagua measured from a base 6 kilometres from the mountain, giving a net result of 22,867 feet for its highest peak, or several hundred feet less than that obtained by Fitzroy from a base at Fort San Antonio, Valparaiso (cf. Journal R.G.S., vol. vii. p. 142). There is also a list of plants collected, with remarks on the botany of the region by Professor Ascherson. Lastly, there is an explanatory note on the maps by L. v. der Becht. The special maps constructed entirely from the traveller's observations, are well drawn, and assist the reader to follow the narrative. We can only regret that some of the photographs, to which frequent reference is made in these pages, were not reproduced for the book, as they would have been a great addition to this entertaining and valuable contribution to the literature of South America.—[E. D. M.]

No. II.—FEB. 1888.]

I

Layard, [Mrs.] Granville.—Through the West Indies. London, Sampson Low & Co., 1887: 12mo., pp. 168. Price 2s. 6d. [Presented by the Publishers.]

Mrs. Layard here relates her experiences of a tour through the West Indies, including an account of the principal objects of interest, together with the scenery of the various places visited. These include Tobago, Trinidad, Demerara, St. Vincent, Barbadoes, Jamaica, and Cuba, besides three river trips—up the Essequibo as far as Suddie, up the Demerara as far as Arima, and to the Penal Settlement on the Mazaruni. The appendix consists of a dissertation on the Sugar Question.

Lemos, Angel M. Díaz.—Compendio de Geografía de la República de Colombia. Tercera Edición. Medellín, Imp. del Departamento, 1887: sm. 8vo., pp. v. and 164.

The Sault Ste. Marie Canal and Hay Lake Channel. Official Report of the Proceedings of the Waterways Convention held at Sault Ste. Marie, Michigan, July 20th, 1887. Duluth, 'Daily News' Print., 1887: 8vo., pp. 46, frontispiece, maps and diagrams. [Presented by C. N. Bell, Esq.]

Weber, [Prof.] Albrecht.—India and the West in Old Days. Translated from the German by Emily Hawtrey. Edited by Robert Sewell, M.C.S., M.G.S., & C. Madras, 1887: 8vo., pp. 27.

Zeledón, Pedro Pérez.—Argument on the Question of the Validity of the Treaty of Limits between Costa Rica and Nicaragua, and other supplementary points connected with it, submitted to the Arbitration of the President of the United States of America, filed on behalf of the Government of Costa Rica by Pedro Pérez Zeledón, its Envoy Extraordinary and Minister Plenipotentiary in the United States. (Translated into English by J. I. Rodriguez.) Washington, Gibson Bros., 1887: 8vo., pp. xi. and 310. [Presented by the Author.]

ARCTIC.

[International Polar Observations.]—Die Internationale Polarforschung 1882–1883. Beobachtungs-Ergebnisse der Norwegischen Polarstation Bossekop in Alten. Im Auftrage des Königl. Norwegischen Cultus-Ministeriums, herausgegeben von Aksel S. Steen, Erstem Assistenten am Norwegischen Meteorologischen Institute. I. Theil, Historische Einleitung, Astronomie, Meteorologie. Christiania, Grøndahl & Søn, 1887: 4to., pp. viii., 31, and 100, plates. [Presented by Herr Aksel S. Steen.]

AUSTRALASIA.

[New South Wales.]—Department of Mines. Geological Survey of New South Wales, C. S. Wilkinson, F.G.S., F.L.S., Geological Surveyor in Charge. Geology of the Vegetable Creek Tin-Mining Field, New England District, New South Wales, with Maps and Sections: by T. W. Edgeworth David, B.A., F.G.S., Geological Surveyor. Sydney, Charles Potter, 1887: 4to., pp. x. and 169.

Victoria, Natural History of.—Prodromus of the Zoology of Victoria; or, Figures and Descriptions of the Living Species of all classes of the Victorian Indigenous Animals. Decades I.–XV. By Frederick McCoy. Melbourne, John Ferres & R. S. Brain; London, Trübner & Co., 1878–1887: 8vo. [Presented by the Government of Victoria.]

GENERAL.

Bossi, B.—La causa principale dei Terremoti e di altre perturbazioni della natura. Continuazione delle *Macchie Solari* dello stesso Autore. Porto Maurizio, Tip. Nazionale—Leonardo Demaurizj, 1887: 8vo., pp. 36. [Presented by the Author.]

Foncin, P.—*Géographie Générale*. Paris, Colin et Cie., 1888: 4to., pp. 244. [Presented by the Publisher.]

M. Foncin has here produced a text-book of geography which may be safely recommended to any one who can read French. It is capable of improvement, no doubt, and we may look for something better in the future even in England; but at present we do not know of anything better on the same scale. M. Foncin endeavours to keep in view throughout the intimate relations between "physical," and "political" geography. His conception of the latter is of the most comprehensive character, so that he embraces all the aspects of a country, and of its relations with other countries, which may in any way be regarded as connected with geography. Throughout he aims at conveying broad views. The space given to France is not inordinate, so that other parts of the world have fair treatment. The page is large enough to admit of maps on a good scale. There are 106 of these, coloured and showing all important features, physical, political, economical, simply but clearly. There are also 102 illustrations, some of which, we must say, are more ornamental than useful.

Geiger, [Dr.] Wilhelm.—*Die Pamir-Gebiete*. Wien, Hölzel, 1887: 8vo., pp. viii. and 184.

[Geophysics.]—*Beiträge zur Geophysik*. Abhandlungen aus dem geographischen Seminar der Universität Strassburg. Herausgegeben von Prof. Dr. Gerland. I. Band. Stuttgart, E. Koch, 1887: 8vo., pp. liv. and 373. [Presented by the Publisher.]

This book is an excellent example of the kind of work which is carried on in the geographical schools of German universities. Professor Gerland has a special class or seminary, evidently intended to train such students as aim at making geography a specialty. This volume contains some of the best results of their work; and the professor hopes to be able to produce a similar volume each year. He makes a point, he tells us, of thoroughly grounding his students in the great facts and principles of what we may call terrestrial physics, which lie at the basis of all geography. Professor Gerland speaks very highly of the work done in England in this region of terrestrial physics—work which, he says, exceeds in value and thoroughness anything done in Germany. He tells us that, although geophysics (which it appears to us includes something more than the "physics of the earth's crust") has a clear and well-defined field, belonging inseparably to geography, there yet exists no definition of the term. He asserts, however, that many other geographers regard geophysics as a department distinct from geography, and attached to general physics. Professor Gerland then goes on in his instructive introduction to discuss the question of the field of geography, and many other important questions connected therewith. One point he insists upon, that although geology and geography deal with the same subject, and have to a large extent the same aim, their points of view are entirely different in their problems and in their fields of work; while at the same time they are complementary and indispensable to each other. The one deals with processes, the other with results. Many other points, both of scientific and of practical interest, are discussed by Professor Gerland in this suggestive introduction. There are four papers by the students, which occupy the bulk of the volume. Dr. H. Blink deals in 58 pages with Atmospheric and Oceanic Currents in the Little Sunda Islands. Dr. Hugo Hergesell (pp. 59–114) treats of the change in surfaces of equal weight through the growth of polar ice-masses and the oscillation in sea-level caused thereby. The same student treats (pp. 115–132) of the influence which a gradual change in the altitudinal conditions of a plateau would have on the angle of slope of a river-course. The last paper is the longest (pp. 133–365); it is by Dr. Emil Rudolph, and deals at length with submarine earthquakes and eruptions.

Hitchman, Francis.—Richard F. Burton, K.C.M.G. His Early, Private, and Public Life, with an account of his travels and explorations. London, Sampson

Low & Co., 1887 : 2 vols. 8vo., vol. i., pp. xi. and 430 ; vol. ii., pp. x. and 460. Price 36s. [Presented by the Publishers.]

The bulk of these two volumes consists of an abstract of Sir Richard Burton's own voluminous narratives of his many journeys in all parts of the world. As it seems fairly well done it may prove useful to those who have not read the originals and who wish to have a compact résumé of Sir Richard's multifarious labours. The introductory portion deals with Sir Richard's early life and education, and is evidently to a great extent written by Lady Burton. Sir Richard was born at Barham House, Herts, March 19th, 1821, the son of Lieut.-Colonel Burton, of the 36th Regiment, who again was the son of the Rev. Edward Burton, Rector of Tuam, in Galway. Sir Richard's education was of the most irregular kind. His parents were constantly on the move, and lived mainly on the Continent,—France, Italy, and Germany, where Sir Richard and his brother had experience of a great variety of tutors and schools. This Bohemian life, however, gave the future traveller an opportunity of acquiring a variety of languages, his taste for which early developed itself. As his father intended Richard for some learned career, he was sent to Oxford, where, however, he never felt at home. After a time he contrived to get honourably expelled, for he was bent on entering the army. He succeeded in his object, and obtaining a commission in the East India Company's service, he left England, June 18th, 1842. His wandering tendencies soon asserted themselves in India, as well as his capacity for acquiring languages, and in a very few years his career as a traveller was before the public.

Hughes, Alfred.—*Geography for Schools. Part I. Practical Geography.* Oxford, Clarendon Press, 1887 : 8vo., pp. viii. and 71. [Presented by the Author.]

It is scarcely correct to include the subjects dealt with by Mr. Hughes in geography. The manual will, however, be a very useful adjunct to the geographical text-book, and in the hands of an efficient teacher ought to be of great service not only in conveying much useful information, but in training the pupils in accurate methods and in habits of correct observation. Mr. Hughes is a very successful teacher of geography in Manchester Grammar School, and his method of training boys to draw maps from memory is one of the most effective we know of. His experience in this direction has been of much service to him in compiling the present manual. Chapter I. deals with latitude and longitude, the drawing of maps from the atlas and from memory; Chapter II. the measurement of the distance between two places on the earth's surface; Chapter III. the rotation of the earth; the consequent difference in the time of day at two places on the earth; Chapter IV. the apparent movements of the fixed stars; the Pole Star; polar distance; Chapter V. the apparent movement of the sun; the seasons; meridian altitude; declination; Chapter VI. length of day and night at any one place, &c.; Chapter VII. movement of the earth; length of shadows; distance to be seen from mountain-summits; the trade-winds; the calendar. The appendix contains a series of examination papers.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Deutschen Reiches.—Karte des —. Scale 1 : 100,000 or 1·3 geographical miles to an inch. Sheets : 87, Ribnitz ; 118, Teterow ; 119, Demmin ; 426, Pitschen ; 475, Münsterberg ; 490, Coburg ; 527, Darmstadt ; 615, Schirmeck ; Herausgegeben von der kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme, 1887. 590, Stuttgart. Herausgegeben vom Königl. Württ. Statistischen Landesamt, 1887. Price 1s. 6d. each sheet. (*Dulau.*)

España.—Mapa Topográfico de —, en escala de 1 : 50,000 or 1·4 inches to a geographical mile. Comienza su Publicacion el Instituto Geográfico y Estadístico bajo la direccion del Excmo. Señor Don Carlos Ibañez é Ibañez de Ibero, Director General, con el concurso de Jefes y Oficiales de Artilleria, Ingenieros y Estado Mayor, Astrónomos, Ingenieros de Caminos, Canales y Puertos, de Minas y de Montes, Cuerpo de Topógrafos y Auxiliares de Geodesia. Madrid. Sheets published in 1886-87:—No. 602, Navamorcuede; 688, Quintanar de la Orden; 711, Las Guadalerzas; 712, Madridejos; 713, Alcázar de San Juan; 714, Campo de Criptana; 736, Malagón; 737, Villarrubia de los Ojos; 738, Villarta de San Juan; 739, La Alameda de Cervera. Price 5s. 6d. each. (*Dulau.*)

These sheets of the Government survey of Spain are beautifully executed; the topographical features are exhibited by a series of contour lines, and the extent of forests, vineyards, and other systems of cultivation is indicated by symbols. The maps are printed in five colours: the roads and towns in red, the contours brown, rivers and lakes blue, forests and vineyards green, lettering and shading black. This system must add considerably to the cost of production, and is doubtless the reason why the price of each sheet is about twice that of those of the French 1 : 80,000 map, and four times that of the sheets of our 1 inch Ordnance Survey. To the cost of production may also, in all probability, be traced the length of time which is allowed to elapse between the issues of new sheets, and it would be a great advantage if the Director General of this survey could see his way to the publication of an advanced cheap edition of the sheets in the same manner as the Italian Government are doing at the present time.

The sheets which are mentioned in this notice all refer to districts within a radius of one hundred miles of Madrid, and unless more expedition is used in the prosecution of this survey and the publication of the sheets, no one, now living, can hope to see it completed.

France.—Cartes des Départements, gravées par E. Guillot. Départements de l'Aisne; Marthe-et-Moselle; d'Eure-et-Loire; du Doubs; Haute-Savoie; des Landes; du Gard; du Gers. Paris, E. Plon Nourrit et Co. Price 6d. each. (*Dulau.*)

Österreichisch-Ungarischen Monarchie.—Übersichtskarte der Eisenbahnen der —, nebst den angrenzenden auswärtigen Landestheilen, herausgegeben im Auftrage des k. k. Handelsministers von der k. k. General-Inspection der österr. Eisenbahnen. Scale 1 : 1,000,000 or 13·6 geographical miles to an inch. Erneuerte Ausgabe. Revidirt im 1888. 6 sheets. Price 11s. (*Dulau.*)

Oesterreich-Ungarn.—Eisenbahn- und Post-Communications-Karte von —, enthaltend fertige und im Bau befindliche Eisenbahnen mit allen Stationen, die Postrouten für Personen-Beförderung und Dampfschiff-Stationen. Mit den Distanzen in Tarif-Kilometern. Scale 1 : 1,700,000 or 22 geographical miles to an inch. Beikarten: Umgebungen von Wien und Budapest, sowie das nördliche Böhmen. Verlag von Artaria & Co., Wien, 1888. Price 2s. (*Dulau.*)

Oesterreich-Ungarischen Eisenbahnen.—Die — der Gegenwart und Zukunft. Karte zur Reise, sowie zur Uebersicht der befahrenen, im Bau befindlichen, concessionirten und projectirten Eisenbahnen, nebst deren eigenthümlichen Benennungen. Erneute Ausgabe mit 3 Beikarten; Das nordböhmische Eisenbahnnetz. —Umgebung Wiens. —Die Orient-Anschlüsse. Verlag von Artaria & Co., Wien, 1888. Price 1s. 6d. (*Dulau.*)

Posen.—Wandkarte der Province —. Scale 1 : 200,000 or 2·7 geographical miles to an inch. Posen. Price 6s. (*Dulau.*)

Strassburg.—Plan der Stadt —, und deren Erweiterungen 1 : 5000 or 14·6 inches to a geographical mile. Strassburg, Schulz & Co. Price 1s. (*Dulau.*)

ORDNANCE SURVEY MAPS.

Publications issued during the month of December 1887.

1-inch—General Maps:—

ENGLAND AND WALES: New Series. 100, outline, Derbyshire and Nottinghamshire portions only containing Dronfield, Staveley, &c. 111, outline, containing Bakewell, Buxton, Hartington, Leek, Longnor, Winster, &c. 203, outline, containing Bedford, Cardington, Cranfield, Newport Pagnell, Olney, Yardley Hastings, &c. 219, outline, containing Bicester, Brackley, Buckingham, Steeple Claydon, Winslow, &c.

6-inch—County Maps:—

ENGLAND AND WALES: Carmarthenshire: 26 N.E.; 1s. Cornwall: 69 S.E.; 1s. Dorsetshire: 23 N.W., S.W.; 1s. each. Gloucestershire: 62 N.W.; 1s. Herefordshire: 47 N.W., 51 S.W., 52 N.E.; 1s. each. Huntingdonshire: 16 S.E.; 1s. Lincolnshire: 39 N.E., S.W., 70 N.W., 82 N.E., S.E., 90 S.W., 130 S.E., 131 S.E., 134 S.W., 135 S.W., 138 S.E., 149A N.W., 154 N.E.; 1s. each. Merionethshire: 21 N.W., 38 S.E., 46 S.W.; 1s. each. Montgomeryshire: 11A S.E.; 1s. Norfolk: 86 N.E.; 1s. Shropshire: 33 S.W.; 1s. Somersetshire: 59 N.E., 69 N.W., N.E., 70 N.W.; 1s. each. Staffordshire: 25 S.W., 30 N.W., S.W., 38 S.W.; 1s. each. Suffolk: 88 S.W.; 1s. Warwickshire: 8 S.E.; 1s.

25-inch—Parish Maps:—

ENGLAND AND WALES: Brecknockshire: XXVI. 8, 16, XXXII. 4, 7, 8, 12, 15, 16, XXXIII. 1, XXXIV. 3, 4, XXXV. 2, 8, 10, 4, 3s. each. Cambridgeshire: XII. 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 15, 16, XIII. 9, XV. 2, 3, 4, 6, 7, 9, 10, 11, 13, 14, 15, 4s. each; XV. 16, 3s.; XVI. 7, 8, 4s. each; XVI. 10, 3s.; XVI. 11, 12, 13, 4s. each; XVI. 15, 3s.; XVII. 1, 5, 9, 13, 15, 16, 4s. each; XXI. 1, 3s.; XXI. 2, 3, 4, 4s. each; XXI. 6, 3s.; XXI. 7, 8, 9, 12, 4s. each; XXI. 14, 3s.; XXII. 1, 2, 5, 7, 8, 9, 10, 4s. each; XXII. 11, 5s.; XXII. 12, 14, 16, XXXIII. 6, XXXIII. 3, 4s. each; XXXIII. 7, 8, 9, 12, 15, XLV. 1, 2, 3, 6, 8, 9, 10, 11, 12, 3s. each; XLV. 13, 4s.; XLV. 14, XLVI. 6, 12, LII. 4, 8, LIII. 1, 6, LVII. 11, 12, LXL. 10, 3s. each. Cardiganshire: II. 12, 14, IV. 8, XVI. 1, 3, 5, 6, 7, 8, 10, 11, 3s. each; XXXIII. 1, 4s.; XXXIII. 2, 3, 5, 6, 7, 9, 10, XLI. 1, 9, 3s. each. Devonshire: CXIX. 15, CXXV. 14, CXXVI. 3, 3s. each. Dorsetshire: VII. 3, 4s.; VIII. 1, 9, IX. 11, 15, 16, X. 9, 13, XI. 10, 14, XII. 2, 3s. each; XII. 4, 4s.; XII. 7, 8, 12, 13, 15, 16, XIII. 1, 2, 5, 6, 3s. each; XIII. 7, 4s.; XIII. 8, 10, 11, 3s. each; XIII. 12, 4s.; XIII. 13, 14, 15, XIV. 1, 5, 8, 11, 12, 15, 16, 3s. each. Herefordshire: XXXI. 3, 3s.; XXXII. 12, 4s.; XXXII. 14, 15, 3s. each; XXXIII. 9, 4s.; XLI. 3, XLI. 8, 3s. each. Huntingdonshire: VII. 9, 13, 14, XXIII. 3, 4s. each; XXIII. 9, XXIV. 12, XXVIII. 1, 2, 3, 5, 3s. each; XXVIII. 6, 4s.; XXVIII. 8, 9, 10, 11, 12, 13, 3s. each. Leicestershire: XLIII. 1, 3s.; XLIII. 2, 4s.; XLIII. 3, 4, 5, 11, 15, 16, XLVIII. 1, 6, 3s. each; XLVIII. 7, 4s.; XLVIII. 12, 3s. Lincolnshire: VII. 3, 4, 6, 3s. each; VII. 11, 5s.; VII. 14, VIII. 2, XIII. 1, 5, 7, 9, 13, 14, XXI. 6, 10, LJV. 3, 7, 9, 16, LXXII. 6, 11, 12, 15, 16, LXXVII. 14, LXXXV. 10, 11, 14, LXXXVI. 6, 10, 13, 14, XCV. 11, 16, CXVI. 1, 5, 7, CXXII. 3, 8, 3s. each; CL. 8, 4s.; CLI. 5, 6s. ed. Merionethshire: XV. 9, 10, XXIII. 1, 3s. each. Montgomeryshire: XXXII. 12, XXXIII. 3, XXXIX. 8, XLVI. 8, 3s. each. Norfolk: XXI. 10, XXXII. 2, 6, 3s. each; XXXII. 7, 9, 4s. each; XXXIII. 10, 14s.; XLIV. 1, 5s.; XLIV. 2, 5, 7, 8, 9, 10, 11, 12, 13, 15, 16, LVI. 12, LXVII. 8, 12, 16, LXVIII. 8, 9, 10, 11, 14, LXXX. 1, 2, 5, 9, 12, 15, 16, XCI. 6, 4s. each. Northamptonshire: I. 8, 4s.; II. 5, 6s. ed.; XXVIII. 15, 3s. Rutlandshire: X. 8, 4s. Somersetshire: XXXVIII. 8, 4s.; XLIII. 1, 6, LXXXI. 2, 3s. each; LXXXI. 10, 4s.; LXXXI. 11, 3s.; LXXXI. 12, 4s.; LXXXI. 16, 5s.; LXXXII. 7, LXXXVIII. 7, 10, 13, 14, LXXXIX. 11, 3s. each; XC. 9, 10, 14, 3s. each. Suffolk: LXX. 10, 3s. Warwickshire: XVIII. 1, 5, 6, 9, XXIII. 15, XXVI. 7, 11, 3s. each; XXVII. 6, 4s.; XXVII. 11, 12, 16, XXVIII. 15, 3s. each; XXXII. 2, 4s.; XXXII. 3, XXXIV. 4, 8, 11, 3s. each. Wiltshire: XXXVIII. 2, LI. 5, 11, 13, LVIII. 1, 3s. each; LVIII. 3, 8, 4s. each; LVIII. 12, 14, 16, 3s. each; LIX. 5, 10, 11, LXIII. 7, 11, LXIV. 2, 3s. each; LXIV. 6, 4s.; LXIV. 7, 10, 12, 13, 3s. each; LXIV. 15, 4s.; LXIV. 16, LXV. 3, 5, 7, 11, 3s. each; LXV. 13, 4s.; LXV. 14, LXIX. 7, 8, 10, 11, 13, 14, LXX. 3, 5, 3s. each; LXX. 7, 4s.; LXX. 10, 13, 14, 15, LXXIV. 1, 3, 4, 5, 8, 11, 12, 14, 15, LXXV. 1, 3s. each.

Town Plans—10-foot scale:—

ENGLAND AND WALES: Bridgwater, L. 10, 20, 24, L. 11, 21; 2s. each. Hinckley, XLII. 7, 15, XLII. 8, 1, 2, 6, 7, 11; 2s. each. Lincoln, LXX. 3, 17, 21, 22, LXX. 6, 10, 15, LXX. 7, 1, 3, LXX. 10, 20, 25, LXX. 11, 1; 2s. each.
(Stanford, Agent.)

AFRICA.

De Kaap and Komatie Goldfields.—Map of the ——— and all adjoining properties, compiled from diagrams of surveyed farms, and reliable information obtained from J. Rissik, Esq., Examiner of Diagrams, R. Pizzighelli, Esq., Surveyor, and others, by G. A. Troye of the Surveyor General's Department. Pretoria, March 1887. Scale 1 : 240,000, or 3·2 geographical miles to an inch. London : J. W. Anderson & Co. Edward Weller, lith.

Pretoria and Heidelberg Goldfields.—Map of the ———. Compiled from diagrams of surveyed farms, by G. A. Troye of the Surveyor General's Office. Pretoria, Transvaal, 1887. Scale 1 : 280,000, or 3·8 geographical miles to an inch. Edward Weller, lith., London.

AMERICA.

Argentine Republic.—Map of the ———. Scale 1:4,000,000, or 55·5 geographical miles to an inch. With a short description of the country, and the latest information as to its Political Organization, Agriculture, Industries, Commerce, Revenue, and Expenditure, Railways and other means of Communication, Education, Labour Market, &c. &c., 1887. Published by the Argentine Information Office, London.

This map has been issued by the Director of the Argentine Information Office, in London, and is intended for the use of emigrants; it has been compiled with care from the latest sources, and being drawn on a moderately large scale, is well suited for general reference. All roads, railways in operation, and projected, are laid down; pasture lands, the uncultivated portions of the country, as well as the sites and extents of colonies are also given. Twenty-one isobars showing the mean annual temperatures of districts south of the twenty-third degree of south latitude are shown, and information as to wages, trades, education, climate, history, commercial statistics, &c., is printed at the back of the map.

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in November and December 1887.

No.		Inches.	
1167	m =	2·1	England, west coast:—Burry inlet. 1s. 6d.
2728	m =	0·2	Spain, north coast:—Bidassoa river to Cape Peñas. 2s. 6d.
1053	m =	0·2	Spain, north coast:—Cape Peñas to Pontevedra bay (plan, Camarinas bay). 2s. 6d.
1755	m =	0·3	Spain, north-west coast:—San Ciprian bay to Cape Finisterre (plan, Corcubion bay). 2s. 6d.
1039	m =	7·3	Norway, south coast:—Christiania harbour. 2s.
106	m =	1·45	Mediterranean, Sardinia:—Palmas bay. 1s. 6d.
2209	{m = m =	{1·0 1·4}	Black Sea, sea of Azov:—Berdiansk road, Ghenitchesk road. 1s. 6d.
415	.. ..	..	Port Matanzas:—Plan added, Matanzas anchorage.
2406	.. ..	..	St. Domingo:—Plan added, approach to Las Cañitas.
1099	m =	4·0	West Indies, St. Lucia Island:—View Fort bay. 1s.
868	m =	various	Central America, west coast:—Ports and anchorages, Uvita bay, Piedra Blanca bay, Port Elena, San Juan del Sur and Nacascolo ports. Liberta anchorage. 1s. 6d.
1050	m =	0·1	Central America, west coast:—San José to Port Angeles. 2s. 6d.
1051	m =	0·1	Central America, west coast:—Port Angeles to Mangrove bluff. 2s. 6d.
1082	m =	1·8	North America, west coast:—Wilmington and San Pedro harbours. 1s.
1226	d =	1·4	Africa, west coast:—Straits of Gibraltar to the river Gambia. 2s. 6d.
1065	m =	1·5	Korea, south-east coast:—Douglas inlet and Sir Harry Parkes sound (plan Centre harbour). 2s. 6d.

No.		Inches.	
55	m =	various	South-west Pacific :—Anchorages in New Britain and New Ireland—Matava bay, Port Weber, Kabakadai bay, Rugen harbour, Tomalili anchorage, Pyron strait to Nusa harbour, Nusa harbour. 1s. 6d.
1060	m =	0·5	South Pacific Ocean, Society islands :—Huaheine to Marua or Maupiti, with the intermediate islands. 2s. 6d.
1360	.. ..	..	Barracoe to Cape St. Paul :—Plan added, Accra. (J. D. Potter, Agent.)

CHARTS CANCELLED.

No.		Cancelled by	No.
1167	Burry inlet	New plan, Burry inlet	1167
2728	Bayonne to Oporto	New chart, Bidassoa river to Cape Pinas	2728
1755	Ferrol harbour to cape Finisterre	New chart, San Cyprian bay to cape Finisterre	1755
2209	Berdiansk road	New plan, Berdiansk road, Ghenitchesk road	2209
106	a, b, c, Virgin islands, 3 sheets		
2146	Plan, Ports San Juan del Sur and Nacascolo	New plans on	868
2148	Plan, Libertad		
2545	Plan, San Pedro anchorage ..	New plan, Wilmington and San Pedro harbours	1082
1226	Gibraltar strait to Gambia river	New chart, strait of Gibraltar to the river Gambia	1226
55	Anchorages in New Britain ..	New plans, anchorages in New Britain and New Ireland	55
2406	Plan removed, approach to Las Cañitas.		

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 1828. England, east coast :—The Downs. 2729. Ireland, west coast :—Sligo and Ballysadare bays. 85. South America, west coast :—English narrows and adjacent anchorages. 1278. South America, west coast :—Cape Paquiqui to cape Lobos. 2531. North America, west coast :—Cape Mendocino to Vancouver island. 1947. North America, west coast :—Admiralty inlet and Puget sound. 952. Japan :—Owasi bay to Takamatsu-no-saki. 2875. Japan :—Seto-uchi or Inland sea. 518. Australia, west coast :—Shark bay. 412. Australia, east coast :—Burnett river. 1629. Tasmania :—Macquarie harbour. 1757. Fiji islands :—Nukulau island to Namuka island. 526. South Pacific :—Harbours in the Society islands.

(J. D. Potter, Agent.)

ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by Colonel H. H. GODWIN-AUSTEN, F.R.S., J. K. LAUGHTON, M.A., and DOUGLAS W. FRESHFIELD, M.A. Contents: Hints on Surveying and Astronomical Observations. John Coles, F.R.A.S.—Meteorology. R. Strachan, F.M.S.—Geology. W. T. Blanford, F.R.S.—Natural History. H. W. Bates, F.R.S., Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.—Anthropology. E. B. Tylor, D.C.L., F.R.S.—Photography. W. F. Donkin, M.A.—Medical Hints. G. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department.—General Outfit. Colonel J. A. Grant, C.B., Edward Whymper, and others. Price, in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, W.; and to be had of Edward Stanford, 55, Charing Cross, S.W.

Instruction for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. Surveying and Mapping, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. Geology, including practical training in the field. By Mr. W. Topley, of the Geological Survey; President of the Geologists' Association. 3. Botany. By Mr. N. E. Brown, of the Herbarium, Kew. 4. Photography. By Mr. John Thomson, Author of 'Photographic Illustrations of China and its People,' and other works.

The lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2s. 6d.

Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers, Vol. I. Part 4.—CONTENTS:—1. Geographical Education.—Report to the Council of the Royal Geographical Society. By J. SCOTT KELTIE, Esq. 2. The Cadastral Survey of India. By Lieut.-Col. BARRON (Beng. Staff Corps). 3. Spirit Levelling Operations of the Great Trigonometrical Survey of India. By Major A. W. BAIRD, R.E., F.R.S. 4. Some Remarks on Clinometrical, or Approximate Heights. By Major J. HILL, R.E. 5. Index to Vol. I.

Supplementary Papers, Vol. II. Part 1.—Now Ready.—CONTENTS:—1. Exploration in Southern and South-Western China. By ARCHIBALD R. COLQUHOUN. 2. Bibliography and Cartography of Hispaniola. By H. LING ROTH. 3. Explorations in Zanzibar Dominions. By Lieut. CHAS. STEWART SMITH, R.N.

THE ROYAL ATLAS OF MODERN GEOGRAPHY,

Containing 54 Maps, thoroughly Revised to Date, with Indexes to 176,500 places, Imperial Folio,
Half-Bound in Russia or Morocco, with Gilt Titles and Edges. Price 6l. 6s.

THE HANDY ROYAL ATLAS OF MODERN GEOGRAPHY,

Containing 46 accurate Maps, and Index to 39,000 places, Imperial 4to. Half-Bound Morocco, with Gilt
Titles and Edges. Price 2l. 12s. 6d.

JOHNSTON'S COSMOGRAPHIC ATLAS,

Containing 66 Maps of Political, Historical, Classical, Physical, and Scriptural Geography, and
Astronomical Plates, with complete Indexes, and copious Letterpress,
Imperial Folio, Full-Bound, Cloth. Price 1l. 1s.

The opinion of the Press is, that this is the best work of its class ever published, and thousands of copies
have been sold within the past three years.

THE TARTANS OF THE CLANS OF SCOTLAND,

Containing 72 Plates of Tartans, Historical Account of each Clan, Armorial Bearings, &c., &c.
Imperial 4to, Handsomely Bound. Price 2l. 2s.

W. & A. K. JOHNSTON,

GEOGRAPHERS TO THE QUEEN, EDUCATIONAL AND GENERAL PUBLISHERS
(ESTABLISHED 1825).

EDINA WORKS, EASTER ROAD, AND 16, SOUTH ST. ANDREW STREET, EDINBURGH
5, WHITE HART STREET, WARWICK LANE, LONDON, E.C.

DR. J. COLLIS BROWNE'S CHLORODYNE



**COUGHS,
C C C
COLD, A
STHMA,
B BRONCHITIS.**

DR. J. COLLIS BROWNE'S CHLORODYNE.—Dr. J. C. BROWNE (late Army Medical Staff) DISCOVERED a REMEDY to denote which he coined the word CHLORODYNE. Dr. Browne is the SOLK INVENTOR, and, as the composition of Chlorodyne cannot possibly be discovered by Analysis (organic substances defying elimination), and since the formula has never been published, it is evident that any statement to the effect that a compound is identical with Dr. Browne's Chlorodyne must be false.

This Caution is necessary, as many persons deceive purchasers by false representations.

DR. J. COLLIS BROWNE'S CHLORODYNE.—Vice Chancellor Sir W. PAGE WOOD stated publicly in Court that Dr. J. COLLIS BROWNE was UNDOUBTEDLY the INVENTOR of CHLORODYNE, that the whole story of the defendant Freeman was deliberately untrue, and he regretted to say it had been sworn to.—See *The Times*, July 13th, 1864.

IS
THE GREAT
SPECIFIC
FOR
CHOLERA,

DIARRHŒA, DYSENTERY.
GENERAL BOARD OF HEALTH,
London, REPORT that it ACTS as a
CHARM, one dose generally sufficient.
Dr. GIBSON, Army Medical Staff, Calcutta,
states: "2 DOSES COMPLETELY
CURED ME OF DIARRHŒA."
From SYMES & Co., Pharmaceutical Chemists,
Simsa. Jan. 5, 1880.
To J. T. DAVENPORT, London.

DEAR SIR,—We congratulate you upon the widespread reputation this justly-esteemed medicine has earned for itself all over the East. As a remedy of general utility, we much question whether a better is imported, and we shall be glad to hear of its finding a place in every Anglo-Indian home. The other brands, we are happy to say, are now relegated to the native bazaars, and, judging from their sale, we fancy their sojourn there will be but evanescent. We could multiply instances *ad infinitum* of the extraordinary efficacy of **DR. COLLIS BROWNE'S CHLORODYNE** in Diarrhœa and Dysentery, Spasms, Cramps, Neuralgia, the Vomiting of Pregnancy, and as a general sedative, that have occurred under our personal observation during many years. In Choleraic Diarrhœa, and even in the more terrible forms of Cholera itself, we have witnessed its surprisingly controlling power.

We have never used any other form of this medicine than Collis Browne's, from a firm conviction that it is decidedly the best, and also from a sense of duty we owe to the profession and the public, as we are of opinion that the substitution of any other than Collis Browne's is a deliberate breach of faith on the part of the chemist to prescriber and patient alike.—We are, Sir, faithfully yours, SYMES & CO., Members of the Pharm. Society of Great Britain, His Excellency the Viceroy's Chemists.

DR. J. COLLIS BROWNE'S CHLORODYNE is the TRUE
PALLIATIVE in
NEURALGIA, GOUT, CAN-
CER, TOOTHACHE,
RHEUMATISM.

DR. J. COLLIS BROWNE'S CHLORODYNE is a liquid medicine which assuages PAIN OF EVERY KIND, affords a calm, refreshing sleep WITHOUT HEADACHE, and INVIGORATES the nervous system when exhausted.

DR. J. COLLIS BROWNE'S CHLORODYNE rapidly cuts short all attacks of
EPILEPSY, SPASMS, COLIC,
PALPITATION,
HYSTERIA.

IMPORTANT CAUTION.
The IMMENSE SALE of this REMEDY has given rise to many UNSCRUPULOUS IMITATIONS. Be careful to observe Trade Mark. Of all Chemists. 1s. 1ld., 2s. 9d., and 4s. 6d.
SOLE MANUFACTURER,
J. T. DAVENPORT, 33, St. Russell St., W.C.

are alone responsible for their respective statements. In MS. communications all geographical names should be written in imitation of Roman type.

Vol. X., No. 3.
New Monthly Series.]

MARCH, 1888.

[To Non-
PRICE

PROCEEDINGS OF THE Royal Geographical Society AND Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE	
SIAM. By J. MCCARTHY, Superintendent of Surveys in Siam	117	NOTE ON THE MAP OF LYCIA PHYLIA. By Professor W. M. RAMSAY
SUMMARY OF EXPLORATIONS IN BRITISH NORTH BORNEO. By Admiral R. C. MAYNE, C.B., M.P.	134	GEOGRAPHICAL NOTES
LECTURES ON GEOGRAPHY, DELIVERED BEFORE THE UNIVERSITY OF CAMBRIDGE, 1888. By General R. STRACHEY, F.R.S., President. LECTURE I.	146	REPORT OF THE EVENING MEETING
		PROCEEDINGS OF FOREIGN SOCIETIES
		NEW GEOGRAPHICAL PUBLICATIONS
		NEW MAPS

MAP.

SIAM

LONDON: EDWARD STANFORD, 55, CHARING CROSS, S.W.
 PARIS: ANDRÉAT-GOUJON.
 VIENNA: ARTANA & Co.
 HAMBURG: L. FRIEDERICHSEN & Co.
 ST. PETERSBURG: WATKINS & Co.
 MANCHESTER: JOHN HEYWOOD.
 EDINBURGH: DODGLAS & FOULIS.
 DUBLIN: HODGES, FOSTER & Co.
 BERLIN: D. REIMER.
 LEIPZIG: F. A. BROCKHAUS.
 NEW YORK: SCRIBNER & WELCH.
 PHILADELPHIA: LIPPINCOTT.
 MELBOURNE: GEORGE ROBERTS.

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR	"
KURRACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 18, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

LIEBIG COMPANY'S EXTRACT OF MEAT

Justus Liebig

. Ask for the COMPANY'S EXTRACT,
and see that it bears JUSTUS VON LIEBIG'S
SIGNATURE IN BLUE INK across the Label.

TEETH LIKE PEARLS

Produced by discarding cheap and gritty tooth powders and acid washes,
which ruin the enamel, and by using daily

ROWLANDS'

ODONTO



A pure, fragrant, and non-gritty Tooth Powder; it whitens the teeth,
prevents decay, and gives a pleasing fragrance to the breath.
Avoid imitations and ask Chemists for ROWLANDS' ODONTO.



PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY AND MONTHLY RECORD OF GEOGRAPHY.

Siam. By J. M'CARTHY, Superintendent of Surveys in Siam.

(Read at the Evening Meeting, November 14th, 1887.)

Map, p. 188.

IN laying before the Society the results of my explorations in Siam during the past six years, it may be interesting to know that my connection with Siam began when, as assistant to Major Hill of the Royal Engineers, the triangulation of the Survey of India was carried from Burma to Bangkok, at the time that that service was under the administration of General Walker.

It was with very great satisfaction indeed I accepted service under the King of Siam. For geographical research alone a grand field presented itself, the greater part of the country not having been previously explored by any European.

I will not attempt to give in detail the story of any of my many journeys, but merely a few particulars of some of the most interesting of them. Before doing so I will make a few general remarks on Siam.

To begin: Siam comprises nearly the whole of the Malay Peninsula north of the fourth parallel of latitude. With the Bay of Bengal on the one side and the Gulf of Siam on the other, we travel north and come in contact with the British possessions of Burma. How much of the countries contiguous to the northern boundary will be English, Chinese, or French, remains yet to be decided. Tonquin is on the north-eastern boundary, and Annam on the eastern, while Cambodia is on the south. Thus Siam occupies the heart of Indo-China, surrounded by powerful neighbours—let us hope, as merciful as they are powerful.

On the west is a chain of mountains which runs in an unbroken range to Singapore, the southernmost limit of the Malay Peninsula; some of its peaks between Burma and Siam rise to a height of 7000 feet, while one peak in the Malay Peninsula reaches 8000 feet. On the east there is another range of mountains which forms the grand watershed of all the rivers that flow into the Gulf of Tonquin and Chinese

No. III.—MARCH 1888.]

K

Sea on the one hand, and the Meinam Kong on the other. There are peaks in this range that reach even 9000 feet above mean sea-level.

Besides these ranges, there is another which breaks away from the western range from a point north-east of Chingmai, and forms the watershed between the Meinam and Meinam Kong valleys. In this range, at the source of the eastern branch of the Meinam, are famous salt-wells. The salt is procured at depths varying from 35 to 45 feet—in these land-locked countries as valuable as money.

The greater part of the valley of the Meinam Kong and the Meinam is mostly flat, diversified by isolated hills, and broken and jagged ridges of limestone mountains. The most important river, though not the largest, is the Meinam Chau Phraya. It is the Nile of Siam, a good rice-harvest very much depending on whether the river overflows its banks or not. The eastern branch of the river is specially known for the numerous crocodiles which yearly carry off some victims.

The navigation of the river for steamers of small draught during a part of the year is pleasant enough; but from the month of January to June, in many parts of the river, after a distance of about 60 miles above Bangkok, there is not sufficient water to float the smallest native craft, and they have to be dragged along the sandy bed of the river.

Two other rivers converge towards the Meinam, the Mei Klong and Bang Pla-Kong. All these rivers are connected by canals, rendering communication easier in a country where roads are conspicuous by their absence.

The Meinam Kong is the largest river, and flows through the northern and eastern parts of the kingdom, receiving the waters of many large affluents; but the channel of this mighty river is so blocked with large rocks and cataracts, that its navigation is very difficult, and in some parts impossible even for native craft.

There is no reliable census of the population that I know of, and one can only form an idea of it by comparison with Burma and Cambodia—countries very similar to Siam in every respect—and I think it would be found that ten millions is beyond the mark.

The population comprises Siamese proper, Lao, Cambodians, Burmans, Annamites, Malays, Chinese, and many tribes of hill-men, as Karens and others. The people for the most part settle on the banks of the rivers, and are employed chiefly in cultivating rice. There are but few villages distant from the large rivers, and in the mountainous parts of the kingdom, the towns and villages are built in open flat valleys, picturesquely surrounded by the mountains, which are clothed with forest from top to bottom, the undergrowth being so heavy that one seldom or never sees any sport, which would change the monotony of daily trudging through the mountains where one's view is confined to within ten yards around.

There is one peculiar feature in this population of different nation-

alities, and that is that they do not amalgamate with one another; and thus it comes about, that near Bangkok itself villages of Burmans and Annamites are found living in separate communities, preserving their own language and customs. They are the descendants of prisoners of war, taken from time to time, when it would appear there was no other occupation for the countries of Indo-China than that of constantly fighting with one another. At Petchaburi there is a colony of people whose fathers were brought down from Sipsong Chu Thai over sixty years ago. While they have preserved their own spoken language, they have actually invented a written one, which now more resembles the Siamese character, than that used in Sipsong Chu Thai.

The climate is far from being enviable. Every one who travels through the country must sooner or later pay the penalty, and get a sharp attack of jungle-fever.

Let me now proceed to give some account of a few of my journeys.

One of my first journeys was to Rahang, or Muang Tak, for the purpose of making a survey from the British boundary at Mya Waddi for the construction of a line of telegraph. I started from Bangkok on the 25th December, 1881, with a small steamer drawing six feet of water.

The river flows through flat country, both sides showing great rice-cultivation, well studded with villages and numerous temples. The villages are continuous, consisting principally of wooden houses, hidden away in groves of coco-nut palms, plantain trees, and bamboos; they seem all alike, and it was difficult to tell where one village began and another ended. On the slopes of the banks advantage is taken of the rich deposit left by the river as it subsides, and tobacco is planted along its whole course.

The country is an uninterrupted flat until Chainat is reached, when a few isolated hills break the monotony of the scene. At Paknam Po, the junction of the two main branches of the river, I changed the steam launch for a flat-bottomed Lao boat, and pulled up the Mei Ping, or western branch. For long stretches this branch of the river has not the trace of a habitation, and the villages, such as they are, are very poor. Until Rahang is reached, there is no place of any importance except Kampang Pet, which, however, is important more from past associations than for anything at the present time, there being many ruins of temples in the district, made of blocks of laterite, which is found cropping above the surface of the ground all over this part of the country.

Rahang is found to be composed of a number of wooden houses, all of the famous teak wood, which is found in large quantities in the forests of the district.

The mountains begin now to close on the river, and within eight miles of Muang Tak, or Rahang, is a magnificent peak nearly 4000 feet

above mean sea-level. In the fields on the right bank I measured a base, and made the usual azimuth and latitude observations, and then carried a triangulation across the mountains to Mya Waddi. I was able to connect three conspicuous mountains which had been laid down from the principal triangles of the Indian triangulation, and thus got a fairly good value for the longitude of Rahang.

The country between Rahang and the British frontier is mostly mountainous and a perfect wilderness of jungle, there being few even of the Karens living there. The Karens are a simple and hardy race of mountaineers, who worship the spirits of the forests; but on account of a tradition that they would receive a religion from the West, they readily receive instruction from European missionaries. They are to be found in small numbers along the border-land of Siam, and what was known as British Burma.

A new interest is attached to this part of the country, on account of the energy and ability of Mr. Holt Hallett, who some time ago placed before the Society his proposals for a railway which was to connect Maulmein with China.

I do not presume to question the feasibility of such an undertaking, but considered as a commercial enterprise it is well to remember that the Indian railway between Poonah and Bombay, on account of the heavy cost of construction, and maintenance of the portion of the line through the hills, is, I understand, not a paying line. What would be the cost of a line over a wilderness of mountains, where the rainfall is measured, not by tens, but by hundreds of inches? and again, where is a traffic of the same amount as there is on the Indian line, to come from? The trade, such as it is, that finds its way to Maulmein, is forced there by want of proper means of communication with Bangkok. I have been told by some traders from Yunnan, that the quickest route for them to take, when on a pilgrimage to Mecca, is by Bangkok. They follow the route to Chieng Rai, thence to M. Phrë, thence to Utaradit; here their troubles begin, for they cannot depend upon securing boats, the only means of communication with Bangkok.

Whatever the trade of Siam, most of it is in British hands. British enterprise holds its own against all comers, in Siam as well as any other part of the world.

But to my journeys: and now I will try and place before you a few of the most interesting points of one of my missions to the Malay Peninsula. We were provided with a small sea-going steamer, and, as there was a very limited supply of fuel, we were obliged to keep near the coast, so that as the fuel became exhausted we replenished it at small places along the western coast of the Gulf of Siam. The scenery was wild in the extreme, the mountains clothed in heavy forest from top to bottom, while we had to cautiously pick our way among the numerous rocks and islands which are along the whole coast.

We arrived at Songkla or Singora, a very prettily situated little town. The Governor is the descendant of a Chinaman from Amoy, who, at the beginning of this century, with a number of adventurers, captured the place from the Malays. The storming of the fort is elegantly illustrated on a brass screen, which occupies one side of the Governor's room.

We next moved on to Tani, the capital of the small Malay State of Patani. Patani was originally a very large country, and was broken up by the Siamese into nine different States. The ruler of each State is under the direct control of the Governor of Singora or Song Kla.

As my journey lay pretty well north and south, I set to work observing latitude and azimuth to peaks, which I intended using as stations of observations.

It was very difficult to get any one to accompany me to the tops of the hills, which, it was urged, were the abodes of spirits, and not visited by their fathers or grandfathers. They, however, were satisfied to know that my grandfather also did not go there, and after the usual delays, a few consented to accompany me.

The forest had dense undergrowth, and we would follow up the course of the streams, and then strike for the summit, not always an easy matter. When the summit was attained, there I remained fast, and to get a view of the surrounding country, cleared the tops of trees (except one left standing as a signal). I then patiently awaited opportunities for latitude observations.

The Malay Peninsula, apart from its interesting position, has many other points worthy of attention. To use the new diction, there are two *spheres of influence*, the one English and the other Siamese.

The inhabitants of the northern portion of the peninsula are all Siamese and Chinese; then come the Sam Sams, a mixture of Malays and Siamese, and who talk a mixed language, but are Buddhists in religion; then the Malays proper, who are Mahomedan in religion. Besides these there are two very curious and interesting tribes, or rather remnants of tribes, the supposed aborigines of the country. They are called by the Malays "Orang Utann," or wild men, and are also known as Sakais and Samangs.

The Sakai has soft black skin and wool; the Samang has also a very black skin, but rough, and has coarse, straight hair. They wander in search of food through the endless forests, the sun their only guide, unencumbered with clothing, leaving no trace of their track. They are clever in snaring fish and game. As weapons, they use bows and arrows, and pea-shooters made from reeds, one of which I saw was eight feet between the knots; the dart is soaked in vegetable poison. These poor people are now mostly confined to the tops of the highest mountains.

The forests are very heavy, with dense undergrowth, chiefly canebrakes; fruit trees are very common, particularly the famous strong-smell-

ing durian, which grows on the loftiest trees. As a single fruit weighs five or six pounds, the sensation is far from pleasant, when picking one's way through the jungle, and hearing them crashing through the trees all round. The fruit is said to be a great delicacy, but it takes a European years to get over the repugnance to the disagreeable smell.

The forests are alive with game; but the jungle is so thick that the only chance of having a shot at anything is to shelter oneself on a platform in a tree overhanging a favourite drinking-place for the animals, which comprise elephants, rhinoceros, tigers, tapirs, pig, and many varieties of deer. The tigers of the Malay Peninsula are mostly man-eaters, and as such are dangerous brutes. One of the men accompanying me was carried away by a tiger. I succeeded in recovering the body, which was some comfort to the relatives, but I am sorry to say the tiger escaped unhurt.

The Malay Peninsula is famous for its mineral wealth—gold, tin, and lead being very common, and worked almost solely by Chinamen. Coal is also found. At the sources of the Perak and Trolubein rivers there are several places where the Chinese extract the gold from alluvial deposits; but there are more places showing that gold-seeking in these localities is not of recent date. At the lead-mines I noticed nearly all the workers are covered with terrible ulcers, which are attributed to the use of the water. The Chinese are not merely miners, but they are fast supplanting the Malays all over the peninsula in every industry. Opium is doing its work of destruction among the Malays, who are all immoderate opium-smokers.

Another of my journeys was to the north-east border of Siam. Contradictory reports came in frequently concerning raids of Haws on the north-eastern frontier, and villages were reported as plundered and destroyed, the whereabouts of which puzzled the heads of those "who ought to know."

It was then decided to send an expedition to the north-eastern frontier, and the King was graciously pleased to appoint me to the command of it. It was His Majesty's command that, as it was reported the country over which we had to work was infested by the Haw or wandering robbers, a strong escort should accompany me, that on no account were we to molest the Haw if they were settling down peacefully and quietly, and that the services of the escort were only to be brought into requisition if the Haw offered violent resistance to our progress through the country. My friend Mr. Leonowens, a young Englishman who was fretting over his enforced inactivity, expressed a wish to accompany the expedition. His desire was soon gratified, and he was appointed to the command of the escort, with orders to select 200 men from the regular army.

Mr. George Bush, the youngest son of Captain Bush, of Bangkok, who had been my companion on other journeys, also accompanied me. I took with me eight Siamese gentlemen, taken from a number whom

I had trained to elementary surveying; they proved of very great service in many troubles.

I will not weary you with a description of our journey by boat up the rivers, but will commence at Saraburi, where we leave the boats and prepare for a land journey. Elephants and bullocks are provided us to transport our baggage to Khorat, the next place of importance. The road passes through a forest called Dong Phraya Fai. Tradition has cast a gloom over this place, and an entry into it is dreaded by the ordinary Siamese. It is said you cannot escape catching fever there. The name was altered in the late king's reign from Dong Phraya Fai (Forest of the Lord of Fire) to Dong Phraya Yen (Forest of the Lord of Cold), and the climate is reported to have much improved since the change of title.

It is said in days of old there ruled over the whole of the district a relation of the founder of the Buddhist religion, who, when he opened his mouth, emitted rays of a singularly bright light. He lived in the forest, which was called after him Dong Phraya Fai. One of his descendants always wore an iron hat, and when he died became a very troublesome spirit. To quiet him he received the name of Chau Muek Lek, or the Prince of the Iron Helmet.

That a railway should be constructed between Saraburi and Khorat is a very old idea, and able engineers have favourably reported on both its feasibility and desirability.

Khorat is a very important city, the capital of a district of the same name. The walls of the city are enormous monuments of labour, but they have a general look of decay; they are about 5400 feet long and 3200 feet broad.

In the district are to be found wonderful ruins of stone temples, and involuntarily, while gazing on them, the question rises in the mind, who were those who carved the beautiful tracings on the walls, and bowed down before the now crumbling stone figures? All knowledge of them is lost in the past. Where clouds of incense rose to "the million gods" now all is still.

Travelling north from Khorat, our next destination was Nongkhai, and so flat is the nature of the country over which we go that carts are used. For some days we marched through excellent country. Extensive grass plains, interspersed with clumps of trees, lay before our view, the horizon seemed fringed with a heavy jungle; and the tall waving coco-nut and areca palms indicated positions of quiet villages.

All this country, however, during the rainy season, must be a perfect sea, judging from the water-marks on the trees, four feet up the trunk. During the months of March and April all has a parched appearance, and the want of water is a great difficulty with travellers. There are numerous swamps all over the country. Salt is procured in large quantities. It appears in the form of an efflorescence on the

surface of the ground, and on a cool morning has all the appearance of a hoar frost. The measured distance from Khorat to Nongkhai is 283 miles, and can be comfortably marched in twenty days, including halts.

Nongkhai is a very important town on the Meinam Kong. Here the river has a magnificent appearance, the channel of the river, when in flood, being about 1000 yards across. In the month of March it is at its lowest, about 25 feet below flood-level, and then had a discharge of 48,000 cubic feet a second.

Nongkhai was the base of our operations for the country over which the Haws seemed to have exercised a terrorism, judging from the sensational stories we heard.

The site of the once powerful Wieng Chan is not far from Nongkhai. The chief of the city rebelled against his father, the chief of Luang Phrabang, and after gathering strength, rebelled in turn against Bangkok, when it was totally destroyed by the Siamese. The story has it, that when Chau Anu was Governor of Wieng Chan, about the year 1825, his son was summoned to Bangkok with a body of men to assist in digging the canal connecting Tachin with Bangkok. It would appear that the Phraya in charge of the canal works insulted him; first kicked and then flogged him. When he returned to Wieng Chan, his angry father rebelled against Bangkok, but his revolt proved a failure. The army from Bangkok totally destroyed Wieng Chan, while Chau Anu escaped to Annam. His daughter, the fame of whose beauty had spread far and wide, was taken captive. It is said of her, that, at different periods of the day, the colour of her body changed, blue being one of the colours she assumed. Thinking that the Bangkok victors, if they had no respect for her person, would at least have some for the temples, she took refuge there and clung to a famous emerald image of Buddha. This, however, did not baulk the victorious general, he seized both princess and image, and sent them to Bangkok.

We were told that the country we were to traverse was utterly uninhabited, and that arrangements for securing supplies were next to impossible. Our arrangements certainly had to be elaborate for a country, over which it would take us twenty-five marches on account of the difficult nature of the paths, and without the chance of meeting a soul until we came to the strongly fortified positions of the Haws, who would be certain to oppose us.

Mr. Leonowens made a selection from the soldiers; the rest with Mr. Bush went by boat to Luang Phrabang.

The crossing of the elephants over the river was interesting—some swam over quietly enough, some, after making a decided protest, gave way; but there were others on whom goading with spears and the application of fire had no effect. They rushed back, and nothing could force them over; another process was had recourse to. Three ordinary boats (*dug-outs*), about 35 feet long, were lashed together; over

these rested a few small rafters, 4 feet by 3 inches by 3 inches, and then one-inch planking. Plantain-stalks and other fodder were placed on the raft. I was doubting whether the raft was strong enough to bear even a single elephant. What was my surprise then to see three elephants at one time actually taken across on it!

After sixteen marches we got within the margin of active operations of the Haws, who were reported close to us and making ready to offer resistance.

The country we had passed, instead of being the total desolation it was represented to be, was very picturesque, with many thriving villages of people from a place with the wonderful name of Hua Pan Thang Ha thang Hok, driven thence by the Haws. On the route we crossed bold lofty mountains, decked with primeval forest; then bare naked rocks, colossal giants of stone, that it was supposed would stop our progress, as the elephants were carrying our provisions; but we discovered ways out of all these difficulties. We met for the first time some of the interesting hill-tribes, called by the Siamese Kha Chays. The Khas look very like Khasias of Assam, dress very much in the same style, in no way being overclothed, and carry their loads similarly on their backs, supported by a band which goes round the forehead. There are said to be seven tribes of this people, all owing allegiance to the chief of Luang Phrabang, and until very recently they were the willing workers for nearly all the Lao of Luang Phrabang, whom they supported with rice; there being few mountains of the whole mountain district of Luang Phrabang that do not show some traces of their hardy toil. They have no written character, but if any one wants to send a message the degree of dignity of the sender is known by the number of notches on a stick, to which is attached a feather and a capsicum, indicating "hot haste," if the message is of that nature. The Khas are the aborigines of the country, and from their legends it would appear that the Lao were driven in from Tonquin, spreading into the present Lao country through the beautiful valley of Taeng.

Besides the Khas, there are the Meos. Their coming is of recent date; they live only on the cool heights of the mountain-tops, in comparative ease and plenty. They resemble Chinese in appearance, all the headmen wearing their hair done up in a pigtail. They bury their dead and practise ancestral worship. They cultivate principally the poppy. It is said the language has no resemblance to Chinese, and that they have no written character; but nearly every man wears a silver circlet round the neck to which a small charm is attached with a Chinese device on one side, and Chinese characters on the other, which are worn to protect them from the influences of evil spirits.

To return to our journey. It became rather more probable that we would be attacked by the Haws, and after a consultation with Mr. Leonowens, we decided on taking only thirty men, as we would be the

better prepared for the Haws, and nothing would be added to their laurels if they succeeded in overpowering us.

We started on our journey over more mountains covered with forests, containing many gum-benjamin trees and varieties of orchids and palms ; but for some days it had been raining, and no poetry was left in us to admire flowers, when all we could do was to keep our footing on the slippery paths, now so overgrown with jungle that it was difficult to trace them, and we had to concentrate all our attention on the path to avoid the sharpened stakes that had been placed in the ground for our benefit. We were, however, rewarded. The country suddenly became more interesting. We were walking on what was once a regular made road. It was nearly level, and went over gentle sloping hills covered with the long-leaved pines. The wind whistled familiarly through their branches, while the ground was covered with most beautiful flowers.

When we came in sight of the fields of Nathaw, about 4000 feet above sea-level, the beauty of the scene was such, that involuntarily we stood still to look on the loveliness that stretched before us. As we marched on the country still further improved, when suddenly we came on a charming little lake called Nong-tang, about half a mile square, and at an elevation of about 4000 feet. The deep blue sky reflected in its clear waters, the ducks, its only inhabitants, skimming over its surface, the waving cedars on the banks, and, more than all, the intense stillness in the midst of such loveliness, forced one to stop, sit down, and enjoy the pleasureable sensations which the landscape excited.

The whole country for many days' marching was a vast plateau, about 4000 feet above sea-level, backed by lofty mountains, one of them, Phoo-san, rising over 9000 feet above sea-level.

There is a great plain called Kungmalane, about six miles broad and ten miles long, covered with short grass which afforded excellent pasturage for the cattle, which in better days swarmed on it. Watching the snakelike course of the path over the plain, and as it ascended the gentle slope of a hill, we were surprised at seeing what we thought tents: then they changed to cattle—the wish was father to the thought ; when brought under the telescope we made them out to be rocks cropping above the surface of the ground. As we approached our supposed rocks, we were astonished to find that they were gigantic stone jars ; some were erect, some were on their sides, others broken. They were of the ordinary shape of water-jars. One that I measured along the broadest girth was 25 feet, the diameter of the mouth being $4\frac{1}{2}$ feet, and it was six feet high. Some of the people with me, who formerly lived in this beautiful country, say they were made by angels to drink liquors from. There is a cave close by which may be worth exploring ; we however had to push on or find ourselves without fuel for the night.

So over this beautiful country, with the exception of a few reports of guns, and the sounds of drums, possibly signals, there was nothing to indicate the presence of a human being anywhere at hand, until nearing Chiang Kwang, once the capital of, I might say, the most beautiful province in Indo-China.

We were very much disappointed. Where was the great city which was reported walled with four thousand fighting men? Rounding a spur we got a straight view of upwards of two miles, at the end of which was a small hill covered with jungle and surmounted with a pagoda. That, we were told, was the city of Chiang Kwang.

To the north, and about three days' journey, are the Haws, who have established themselves in their stronghold of Tung Chiang Kum, and exercised a terrorism over the whole of a beautiful province. It was too far advanced in the season, and we had to make what haste we could to reach Luang Phrabang.

We hurried over still beautiful country, which showed in every direction evidence of the destructive ravages of the Haws; but not a soul was to be met with until we reached Muang Ngan. This is in an excellent position at the head of the Nam Chan, and at an elevation of about 5000 feet above the sea-level. A few months previously people got ready to resist an attack of the Haws, at the time that Dr. Neiss, a plucky and energetic French traveller, had gone there. The people told me that Dr. Neiss had written a letter to the Haws at Tung Chiang Kam, and that they replied in person.

Dr. Neiss was obliged to abandon all his property, and under very great difficulties reached Nongkhai. Two French priests who had settled in Ngan for about ten months managed to escape to Annam. Reaching Tatôm, we had left the highlands behind us; here we constructed some rafts, and floated down the river, now and again being delayed as a raft was broken in a rapid. We, however, eventually got to Nongkhai again.

Our journey to Luang Phrabang was slow and uninteresting, up a mighty river fast swelling from the rains, with its innumerable rapids, rocks, and consequent delays.

Luang Phrabang, when it had the name of Lan Chang, was the capital of a powerful and populous kingdom. As the Siamese say, "Luang Phrabang eats many men," and during the last five or six years many men have fallen victims to a terrible fever contracted there. It is beautifully situated, and the river closed in by the mountains has the appearance of a lake.

The well-known naturalist traveller, Charles Mouhot, fell a victim to fever there; and it was my sad lot to see my young companion, Mr. Bush, stricken with fever and die there also.

The Siamese Governor of Pechai, a man loved by his people, after having gone through innumerable exposures and risks, at last succumbed to this terrible Luang Phrabang fever.

Enough of my own journey, but I wish I could lay before you the details of an interesting journey made by Mr. E. B. Gould, who, while H.B.M.'s Consul at Chiengmai, journeyed to Muang Hang. He kindly placed at my disposal the results of his journey, which I have incorporated in the map. Before concluding, I may say a few more words about those Haws who have devastated beautiful provinces, and are still giving great trouble.

The term Haw is the Lao word for Chinamen, but it is now being applied to those worthies who employ their time in plundering. It is supposed they were originally the remnants of the old Taiping rebellion, who settled in Tonquin and lent themselves as soldiers to the then Annamite Governors. In time they became too powerful for the Governors, and either exacted a large annual payment in silver, or became Governors themselves. They ranged themselves under different standards, the principal colours of which were black, red, yellow, and striped (red, white, and blue). The name of the chief of the standard was written in Chinese characters on the principal one. The bands were composed of Chinese, from Yunnan, Kwangsi, and Kwangtung. They ravaged the countries near them, extending their operations yearly, the governors of which used to employ another band to revenge their wrongs; and in this way the different flags were constantly fighting one against the other until the French war in Tonquin, when they became united for the single purpose of fighting the French.

It was Haws of the striped banner who overran Chiang Kwang or Muang Puen about fifteen years ago, and extended their ravages as far as Nongkhai; here, however, they were destroyed by the Siamese, and their stronghold of Tung Chieng Kum was razed to the ground by another section of the army under the command of Phraya Rat.

They came back to Tung Chieng Kum, and the same Siamese general, Phraya Rat, who defeated them before, was sent against them again. He marched on Tung Chieng Kum, and was so certain of making short work of the place that he made no arrangements for his supplies.

He was wounded shortly after making an attack on the Haws' position, and the Haws eventually escaped. The honour of destroying the place fell to Phra Amarawasie, the son of the Prime Minister, who has done credit to the training he received at the Royal Academy of Woolwich.

On the north-east of Luang Phrabang, Phraya Suri Sak, a general in whom the King has always placed implicit trust, has been operating against Black Flags and Yellow Flags. These Black Flags are excellently armed with Remingtons, Martini-Henries, Sniders, and repeating rifles, and their ammunition is of the best, being all solid brass cartridges from Kynoch, of Birmingham.

I understand that an arrangement has been entered into by which

the Haws are to be suppressed by the combined action of the French and Siamese.

Let us hope these beautiful countries will soon be restored to prosperity, and the inhabitants left free to lead the peaceful lives they so much desire.

The following discussion ensued :—

Mr. ERNEST SATOW (H.M. Minister, Bangkok) thought the members of the Society were heartily to be congratulated on having secured a contribution to our geographical knowledge of Siam from the gentleman whose paper they had heard read. Since Mr. M'Carthy accepted his present appointment under the Siamese Government, he had performed a large amount of excellent work, especially in the Siamese territory to the north-east and east of the Mekong river, respecting which so little accurate information had hitherto been made public. The existing maps of the Siamese portion of the Indo-Chinese Peninsula mostly present us with errors or vague conjectures. Indeed, it might safely be said that up to the present time we possess no even moderately good map of Siam, still less of her Laos provinces. When he had the honour, more than three years ago, to be appointed H.M. representative at Bangkok, he naturally endeavoured, before starting for his post, to obtain some information respecting the country, and he applied to a well-known London map-publisher for the most recent maps of Siam. He had nothing better to offer than the '*Carte de l'Indo-Chine Orientale*,' published under the auspices of the French Admiralty, and a map of Burma, Siam, and Cochin-China, which professed to be by the well-known, but, he imagined, long-defunct Arrowsmith. It was styled a new edition, and bore the date of 1875, which looked suspiciously like a recent addition to the imprint. It contained all the old errors, such as the watercourse formerly supposed to unite the rivers Meinam and Meikong; and it was clear that no use had been made of the chart of the latter river, published in Garnier's '*Voyage d'Exploration en Indo-Chine*,' which came out in 1873. He did not quite know whether that was altogether to the honour of British cartography, though it might perhaps be considered a credit to our mercantile enterprise. It is needless to add that he never made any use of this valueless and very incorrect map. A far superior one in every way was that lithographed a good many years ago from the surveys which the Siamese Government caused to be made in 1867 and 1868. But it was never published. However, all these maps were about to be superseded by that constructed by Mr. M'Carthy, from his own surveys and those of the young Siamese trained by him, which, he believed it was not indiscreet to add, was being engraved for publication by the Society. It was indeed time that a new and authentic map should see the light, in order that the old errors might be exploded for ever, such, for instance, as the theory that the river Meinam rose in the snow-clad mountains of Yunnan, which was repeated in a paper read before the Italian Geographical Society, and published by them no later than September of last year. It was to Mr. Holt S. Hallett—whose name was already known to the Society as that of an indefatigable explorer in Northern Siam, and to the world in general by his efforts to promote railway communication between Burma and South-western China—that we were indebted for the discovery of the true source of the Menam, which lay actually within the Siamese frontier. But the Italian Geographical Society no doubt still cherished the old belief, and would continue to do so until the appearance of the new map. In connection with this subject, it was a little difficult to avoid trenching upon political considerations; but we all knew what an important bearing the accurate delineation of frontiers had upon the relations between adjoining States. The attempt to lay down boundary-lines upon insufficient information, and without correct maps, had

frequently produced complications which we had no wish to see recur in the case of Siam. Reverting, however, to the question of exploration from the purely geographical point of view, he thought it was greatly to be regretted that English travellers and discoverers of the present day had so completely neglected the countries we had heard of to-night. Since the death of the lamented Charles Mouhot, who fell a victim to his scientific ardour in 1860, more than a quarter of a century ago, no independent English explorer had visited that vast region. Africa seemed to be the fashion, and nothing but Africa seemed to go down with the public. Compare for a moment the amount of energy expended in searching for the sources of the Nile, with the almost complete ignorance in which we still were with regard to the upper courses of the Brahmaputra, the Irawadi, and the Salwin rivers, which flow through the dominions of the Queen, and drain the wide territories which have recently been added to the British Crown. It would be perhaps said that the obstacles were insurmountable, but those very obstacles ought to act as a spur to the enterprise of our younger men. If, however, they were not disposed to go so far afield in the quest of glory and the Society's medal, they would find plenty of occupation for years to come in the valleys of the Meinam and Meikong. There were still huge gaps left to be filled up, mountains to be ascended, tributary streams to be explored. Then again the botany and zoology of Siam were practically unknown. We might fairly surmise that the flora and fauna of this immense expanse of territory were related to those of Burma, Malaya, Indo-China, and China; but we wanted to have these conjectures verified. The additions to our knowledge of the natural history of Siam during the last thirty years might be almost counted on the fingers of one hand, and in fact, since the death of Sir Robert Schomburgk, it might be safely asserted that next to nothing had been done to render Siam less of a *terra incognita* in this respect. Such facilities as governments could afford would not be wanting if the learned societies of London would combine their resources and send out a properly equipped naturalist-explorer. At any rate, if that could not be done, it was to be hoped that the Geographical Society would find room in some of their publications for whatever contributions might be offered to them by gentlemen like Mr. M'Carthy, whose knowledge of the language and the people so well fitted him to lift the curtain that had too long concealed from our eyes this very interesting portion of Asia.

Mr. A. R. COLQUHOUN said he was sure that all present must have listened with great interest to the excellent paper that had been read. He had travelled in countries near the region in which Mr. M'Carthy had laboured, and knew something of the enormous difficulties under which his work must have been carried on. The climate was exceedingly trying to the explorer, and during the five or six years he was in Siam, Mr. M'Carthy had to undergo very serious privations, about which he had said nothing in the paper. With regard to the project for connecting the Burma littoral with South-western China, the facts ascertained by Mr. Hallett and himself were so divergent from the views expressed by Mr. M'Carthy, that he would prefer to rely on the report recently submitted to the Government and the Chambers of Commerce rather than discuss the question at the present meeting. Mr. Annan Bryce, a member of the Council of the Society, would be a much better critic than himself of the statements in the paper. Mr. Bryce had travelled in Burma and Siam, and over a great portion of the country which Mr. M'Carthy described as "a wilderness of mountains," and would no doubt say whether he considered that description applicable. Mr. M'Carthy had also said that the rainfall in the ranges which separate Lower Burma and Siam was not to be measured by tens, but by hundreds of inches, and he would ask Mr. Bryce to say if that was correct or not. In his (Mr. Colquhoun's) opinion it was a most unfair description of the real facts. Mr. M'Carthy stated in his paper that, after leaving Paknam Po, the junction of the

two main branches of the river, he changed his boats and went on another branch, and "for long stretches this branch of the river has not the trace of a habitation, and the villages, such as they are, are very poor." That was hardly an accurate description of the country, because the surveys of Mr. Hallett, which were very detailed, showed that there were 50 villages, some of very considerable size, between Kampong Pet and Paknam Po, and 16 villages between Kampong Pet and Rahang. According to the Governor of Rahang, in that town itself and the suburbs there were 4000 houses, and in the Rahang district 40,000 houses. In Kampong Pet district, according to the Governor, there were 30,000 houses. He therefore did not think that the country could fairly be regarded as unpopulated and "poor." Certainly, when contrasted with Burma, it was neither unpopulated nor "poor." The question of frontiers was very important. Mr. M'Carthy had stated that in the north-east corner of Luang Phrabang the people who inhabit the valley of the Mei Kong were driven down from the neighbourhood of Tonquin. At present the French were in Tonquin, and a Franco-Siamese Commission was on its way to settle the delimitations of the frontier in that direction. The Haws, who were really freebooters, the Black Flags, who had given the French so much trouble during the last three or four years, were being gradually driven precisely in that direction. As Luang Phrabang, according to the French, was a most important place from a strategical and commercial point of view—the key, in fact, to that part of Indo-China—it was not unlikely that when they were once there, they would see very potent reasons why they should stay there. The Haws were in reality the riffraff who had been driven over the Chinese borderland to the western side of Tonquin, and who were now being forced step by step down to Luang Phrabang. That process was very likely to continue.

Mr. J. ANNAN BRYCE said that his impression was that Mr. M'Carthy had referred only to the cost of the piece of the line over the mountains, and compared the cost of the piece of line over the Western Ghats with what would be required for a line from Maulmein to Rahang, which was a very small portion of the line proposed by Mr. Colquhoun and Mr. Hallett. It had not occurred to him that what was said in the paper was at all a destructive argument against the advisability of constructing the railway as a whole. He himself had not passed over that particular piece of country, but 60 or 70 miles north of it, where the character of the mountains was similar, but more difficult. He did not think that Mr. M'Carthy was justified in comparing either the character of the mountains or the country lying to the east of them, which Mr. Colquhoun's and Mr. Hallett's scheme proposed to tap, with the Western Ghats, or in calling the country to the east a wilderness. The mountains were very much easier for a railway than the Western Ghats, and the country to the east embraced a great number of fertile plains, which not only raised valuable products, but maintained a large and thriving population. The rainfall on the western slopes of the mountains was of course very heavy, comparable to a certain extent with that of the Western Ghats, but not so heavy. At Matheran, just above Bombay, the rainfall was 400 or 500 inches a year, but he did not think that in the neighbourhood of Maulmein it was more than 250. On the eastern, or Siamese side the rainfall was very small, and he was struck with the extreme dryness of the climate in Lao. In his opinion there was too little, not too much, rain. Mr. M'Carthy had said that the rivers ran very low in the dry weather, so that the navigation was extremely difficult, and that the small trade which reached Maulmein at present was driven there by reason of the difficulties of communication between China and Bangkok. If that were so, was it not evident that with a better communication with Maulmein they would get a much larger development of trade? At present the trade went to Maulmein, though it was, according to

Mr. M'Carthy, through a "pathless wilderness," and did not go to Bangkok, notwithstanding the absence of a "pathless wilderness." With regard to the general value of the paper, he wished to support Mr. Satow's suggestion, that, if possible, some means should be found to publish a complete copy of the notes which Mr. M'Carthy had taken on his journey. It was quite clear from the short account given in the paper that they would be full of valuable information.

Mr. M'CARTHY said that without questioning any of the opinions put forward by the gentleman who had just spoken, he would explain how he arrived at the view that the rainfall in the "wilderness of mountains" was to be counted by hundreds of inches. On one occasion he was on the bank of a river just before the rains began, and the rivers flooded to such an extent that he was unable to pass over. Being in a hurry to get on, he constructed some rafts, and though those rafts were high up on the banks, they were swept away by the morning, and he had to remain on the banks ten days. He presumed from that fact that the rainfall was very large, but he kept no rain-gauge. The mountains were much higher than at Maulmein, where the rainfall was 200 inches. Although he had spoken of a "wilderness of mountains," he had not said that they were pathless. There was a path, and that was the reason the trade went there. If there was a path to Bangkok, the trade would go in that direction. Mules and donkeys could be taken along the path to Maulmein, but traders could not feel sure of getting a boat at Utaradit. He did not mean to question the feasibility of constructing the line which had been proposed by Mr. Hallett and Mr. Colquhoun, one of his reasons for not doing so being that he had not the ability to do it.

Mr. HOLT HALLETT said that the wilderness of mountains spoken of by Mr. M'Carthy as lying between our frontier and the Siamese town of Rahang is crossed in every direction by porters and caravans of laden oxen. A sketch map lent him (Mr. Hallett) by the Governor of Rahang, which was evidently copied from Mr. M'Carthy's own survey, showed no less than eleven caravan routes passing between Rahang and the Thoungyeen river, which separates Siam from Burma. These hills were well known to our foresters, indeed better known than any other part of Siam. It was absurd and not fair to compare the cliff-faced hills mounted by the Poonah Railway with the single range of hills with branch valleys which separate the Thoungyeen from the Mei Ping valley. In talking of a wilderness of jungle, he presumed that Mr. M'Carthy had fallen into the same error as many other travellers. The timid Karen inhabitants in that part of the country did not build their villages alongside the routes, because they used to be compelled by travellers and Government officials to carry all the burdens, and were subjected to a sort of *corvée* labour. Upon inquiry at Maing Loongyee he found that the basin of the Mei Nium, which he had been passing through under the impression that it was an almost unoccupied country, was peopled by 10,000 Karens and about 8000 Lawas. It was impossible for a traveller who had not the same opportunities of making inquiries that he had, to ascertain what the population of the country was. At Rahang he met Mr. Stevens, a lawyer, well acquainted with the country, and it appeared that out of those hills which Mr. M'Carthy had called a "wilderness of jungle," a great quantity of valuable timber was extracted. Rahang and Lakon were the two chief points from which sapan, the celebrated dye-wood, is sent to China. A very large revenue, too, was obtained from the teak in the valley of the Thoungyeen, and a great part of the exports of teak to Maulmein and Bangkok had come from that "wilderness of jungle." Mr. Matthews, the chief engineer of the railways in Burma, told him that he had been into the Thoungyeen valley, and was astonished to find so much cultivation there. There were really large plains in that valley. At Rahang the timber was so valuable, that the Government levied a tax, not only on

teak, but on other woods. Mr. M'Carthy said it would be a capital thing to make a railway from the Meinam river near Bangkok up to Korat; but he had not mentioned that that line would pass not only through a "wilderness of jungle," but through one of the most pestiferous regions of the world. The magnificent country, the delta of the Meinam, not one-twentieth of which was cultivated, was inhabited by tigers, bears, wild elephants, &c., and therefore might likewise be described as a "wilderness of jungle," but improved communications would lead to an increase of population. It was simply want of inhabitants that allowed the greater part of Burma and Siam to be still a wilderness of jungle. Between Rahang and Kampong Phet, his survey-book showed, besides those towns, sixteen villages, some of considerable size. The Governor of Rahang informed him that his province contained 40,000 houses, and the town 4000. Of course, allowance would have to be made for exaggeration, but even assuming that the province contained half of the 40,000, it was much better populated than the greater part of the district through which the Burma railways had been made. Between Kampong Phet and the junction of the Mei Ping with the Meinam there were 49 villages, some of them of considerable length, and built on both sides of the river. The Governor of Kampong Phet told him that there were fully 30,000 houses in his province. Altogether he considered that there was ample population along the banks of these portions of the river to ensure very remunerative returns for a railway.

Mr. M'CARTHY said he admired the energy with which Mr. Hallett had placed his scheme before the public, feeling sure that he had intended to do good. He (Mr. M'Carthy) had carried a triangulation over the country between Rahang and Mya Waddi, and it was absolutely necessary for him to climb to the tops of mountains. In doing so he was compelled to avoid the ordinary roads, and if the villages to which Mr. Hallett had referred existed, he must have seen them. It should, however, be remembered that a village might consist of only one, or two, or three houses. Mr. Hallett's friend had been surprised to see cultivation even in a plain; then what sort of country must the other parts be? He would be exaggerating if he said that in the mountains between Mya Waddi and Rahang there were thirty houses. It was necessary to understand what a Siamese village meant. Along the river from Paknam Po to Kampong Phet every bend and every half-bend of the river had a local name. If anybody erected a bamboo shanty on the side of the river, it would get a local name. Unfortunately, the word "ban" in Siamese might mean one bamboo shanty, or two, or thirty. When poling up the river, one or two such shanties might be seen, then a long distance of grass jungle and forest, then another two or three shanties, and the traveller would be told they were under the jurisdiction of the headman of the village, who might reside in another bamboo shanty two or three miles away.

The PRESIDENT asked the meeting to set aside for a moment a great deal that had been said during the latter part of the discussion, and really to consider what it was that Mr. M'Carthy had done. He had surveyed a vast tract of country which, as Mr. Satow had reminded them, was previously absolutely unknown. He had in short produced a map of Siam which had cost him six years of great labour under very great difficulty. The paper which he had read did not at all adequately represent the value of the work he had done. His map was now being engraved for the Siamese Government, and when it was completed, it would be acknowledged as an uncommonly fine piece of work for a single individual to carry out under the circumstances in which Mr. M'Carthy had been placed. Any person might be proud of having done it. It was, as Mr. Satow had said, a misfortune that Englishmen had not travelled more in Siam, where apparently there was a most friendly feeling on the part of the Government, and where certainly there was such a feeling on the part of the representative of Her Majesty at Bangkok, in favour of exploration. It was to be hoped

that a really exhaustive examination of the country would be made. It was not necessary for him to say much about the scheme for a railway from Maulmein to China. If anybody desired to carry out such a line, by all means let him do it; but from the position in which he (the President) was placed, he knew a great deal about the manner in which such schemes were put forward, and he was bound to say that the criticisms that had been made on the project in some newspapers appeared to be very reasonable and fair. Comparing the distance through which the railway would pass in British territory with the entire length of the line, it was hardly fair to say that the British Government were not doing their duty if they did not undertake the risk and responsibility of carrying out the project. For the results obtained by Mr. McCarthy that gentleman deserved the highest thanks of the Society.

Summary of Explorations in British North Borneo.

By Admiral R. C. MAYNE, O.B., M.P.*

(Read at the Evening Meeting, January 30th, 1888.)

ON the 12th of last month I attended here to listen to a very interesting paper by Mr. Daly, describing two journeys he had made in the southern part of the territory held by the British North Borneo Company. At the close of that meeting, the President said it was a pity the Company had not done more in the way of exploration in that little-known country. As I walked home that evening, I thought that a short summary of what has really been done geographically would interest the Society, and also show that our very limited staff had really achieved a good deal in that way, and the Chairman of the Company (Sir R. Alcock) agreeing with me, I have attempted the task, trusting in the kind criticism of the audience. I only hope our territory will be taken into consideration by the Council as meriting their attention, and I will endeavour to show we have done enough ourselves to deserve encouragement and help.

The first exploration after the Cessions, but before the Company was formed, was one undertaken by Mr. T. S. Dobree in 1878, at the instance of "several planters and merchants connected with Ceylon, for the purpose of ascertaining if the land was suitable for coffee." Our agents were then only established at Sandakan, Papar, and Tampassuk. He went up the Papar river to its junction with the Gallamuttai, then up a path by the side of that river for three days, reaching an altitude of 4200 feet, on what he describes as "the main ridge and watershed of the country, which runs from Kinabalu in the north-east to the south-west of the island; this main ridge running at right angles to the one up which I had been walking." He remarks, that by climbing a tree he had a magnificent view of Kinabalu, Gaya Bay, Papar, Kimanis, and Labuan, with several clearings in the distance. This place he calls "Nygapass," and he mentions that the streams on the south of the ridge flow from it to the south and east of the island, most probably

* For map, consult 'Proceedings' for January, *ante*, p. 60.

to the Kinabatangan river. He describes the banks of the Papar river—which was 50 to 80 yards wide, and 2 fathoms deep below the Gallamuttai—as lined with coco-nuts and roughly cultivated patches of sugar-cane, hill paddy, cassava, jak, mango, &c.; also large extents of low paddy-fields, and swamps in which sago, one of the principal articles of food, is grown. Good grazing; and the cattle, of which he saw several herds, were very good; they have no hump. The plain which runs along the seaside is from 10 to 20 miles in width. Mr. Dobree seems to have had no trouble with the natives, except from their laziness. He speaks of “the resemblance to Ceylon in the lie of the land, appearance of jungle, soil, rainfall, &c., which is so striking, that in looking round in the jungle it is difficult to fancy yourself out of the central or southern parts of the southern province of that island.” He felt “certain” that land could be found there “which would grow coffee and would pay,” and mentions a forest of 8000 acres between Papar and Benoni, that, being swamp, is all available for sago.

Mr. Dobree then went to Sandakan, always the chief port, and now also the seat of government. As Mr. Treacher has only lately returned from there, I will say nothing of the town of Sandakan, except that it must bear a very different aspect from what it did when Mr. Dobree visited it in July 1878, and “arranged to go up country a short distance with Mr. Pryer.” They went 20 miles up the Segaliud river in a canoe. Mr. Dobree afterwards struck into the jungle one mile up the river, and describes it as “very fine, the timber enormous, the biggest I have ever seen, and the soil a rich chocolate colour to any depth, the lie of the land very easy and undulating.” . . . The natives say this forest extends from the Kinabatangan on the south to Kinabalu on the north. He saw wild cattle and pigs, a bear, and rhinoceros tracks. On the 4th August Mr. Dobree went up the Kinabatangan to Malapi, 60 miles from the mouth, where the river was 200 yards or more wide, and with 8 fathoms of water. This river has an 11-foot bar across the entrance. “I believe (he says) that the whole of the Kinabatangan country is a magnificent field for tropical agriculture,” and he recommends an experimental garden, such as we afterwards established at Silam. The climate of Sandakan he speaks of as being much cooler than Ceylon. “In a cadjan hut, the thermometer on one occasion only went up to 89° Fahr.; this in July and August. The nights were very cool, and the heat much drier. I must conclude (he adds) by repeating, that though not suited to *Coffea arabica*, the land around Sandakan and Kinabatangan is the finest field imaginable for all low-country products.”

Mr. Dobree then went back to the west coast, and visited the Tampassuk, Pandassan, and the valley of the Ginambur; and he speaks of the valley of the Tampassuk as containing 20,000 acres of land available for sugar-cane and paddy. “I went (he says) to see one of the finest sugar estates in the Straits, and, from what I saw there, I believe the

soil at Tampassuk on this plain to be finer than on the estates I saw, and the Tampassuk climate is certainly more suitable for the canes than that of the Straits."

On the 20th September he started with Mr. Pretyman—the Resident—seven buffaloes, and twelve men, for the valley of the Ginambur, which leads up to the south-west spur of Kinabalu. He objects to travelling on buffaloes, though he considers it better than on foot; it seems the buffalo track frequently crosses the river, and "until you have learnt to stand on the buffalo's back (as my guide did) while they are swimming, I can't say it is pleasant, but it is better than swimming yourself, and marching constantly for a mile at a time through a stinking swamp up to your middle." This alternative, with the off-chance, which existed in those days, of meeting a strong detachment of that amiable class of natives called "head-hunters," who seemed to be indifferent to whose head they hunted, though possibly preferring a stranger's, shows the hardship of the explorer in such a country. I regret that time prevents my going more into details of the various journeys and dilating more upon these hardships, and the courage and perseverance of the brave fellows who carried them out, or lost their lives in attempting to do so. The next day (22nd) they met Mr. Burbidge and party on their way from Kinabalu, who told them he had seen no virgin forest, though he had been up nearly 10,000 feet, the Dusans having already cut down and cultivated all the land he had seen, except some steep slopes of the Kinabalu and Saduk Saduk to a height of 3000 feet or more. Mr. Pretyman and he then went on, but finding no virgin forest available in the Ginambur Valley, he determined to retrace his steps and go out in the Pandassan direction. Finding no more land for his purpose, he returned; and so ended his explorations.

The next journey was undertaken by the ill-fated Mr. F. Witt, formerly an officer in the Austrian Navy, who started from the north-west end of Marudu Bay on the 10th November, 1880, and reached Papar on the 5th December. This was a long and arduous journey, occupying twenty-five days and covering some 150 miles. Passing well to the east of Mount Kinabalu, striking the head-waters of the Sugut river, which flows into the north of Labuk Bay on the east coast, and then turning west to the Padas and Papar rivers, he passed through several villages, varying in size, at all of which the party were hospitably treated. The village of Koligan, 2200 feet above the sea, seems to have been their highest point. The special geographical feature of this trip was the wiping out of the large lake (Kinabalu), which had always appeared on the charts since the days of Alexander Dalrymple, more than a century ago; of this Mr. Witt says, "the problem of the great Kinabalu Lake, I venture to assert, can be safely considered as solved." And he describes very amusingly the terror of the natives at the very notion of going there, and how they expected to be devoured by all sorts of

monsters. He had to bribe the guide with a petticoat for his wife, and payment in advance was stipulated for, owing to the certainty that a big fish would devour them. Poor Wittl, it is curious that he should end this diary with the following: "A gracious Providence let me carry the drug against Sumpitan-dart and snake poison in my vest pocket from Bongon to Papar, without making me resort to it."

Mr. Wittl's second journey was between the 13th May and 17th June, 1881, and consequently of more than a month's duration. In this rapid sketch I must leave you to imagine the many dangers and trials of all kinds—usually made light of in the explorer's own account—which must be encountered during a month's exploration in an entirely new country, through dense jungle, across marshes and streams, as well as over high ridges, under a tropical sun, and with the chances of being knocked over by fever on the one hand, or by a native on the other, as did actually happen to Wittl on his next journey. These conditions, you must remember, attach to all the explorations I am running over, and the way they have been met and overcome by the Company's officers deserves the highest praise.

The spirit in which our exploring has been carried out should also not pass unmentioned in this record, for it is the high sense of duty; no quest of El Dorado, for the gold is not theirs if they find it—little of personal ambition, for their deeds are almost unknown. I do not know that it can be better stated than in Wittl's own words at the end of his first journey. The natives were very proud of the journey they had made; and he writes, "They questioned one another, 'What will our old men at Tampassuk say?' 'What will my employers say?' is the query with me. We did not achieve great things, but the little we did outside the round of everyday business will serve the purpose for which it was done; whenever we came to a place for the first time, there we dare show our faces again. To make sure of this, required a good deal of attention, for the natives are rather mixed in their temper—genial in some villages, churlish in others. However, not even the accident of 'misunderstood' occurred in our intercourse with them; and no sort of accident in our own ranks. It is this spirit among our people, and the mild, but firm government, which has enabled us to rule peaceably in this country—nearly as large as Ireland, with no army, and a police of two hundred men."

On this occasion the point of departure was the same as before, i.e. Bongon, at the head of Marudu Bay, of which he remarks that "Bongon has become for us a sort of Zanzibar." Leaving this, he struck more to the east than on the former journey, as far as Tesapong, about 30 miles, and then southward nearly parallel with his former journey to its southernmost point, whence east to Sandakan, instead of west to Papar. His greatest elevation was 2446 feet (by boiling-point thermometer) above sea-level near Waigan, but the general height seems to have been greater

than before, as he crossed 2300 feet on the road to Toyon, and speaks of being at an elevation of 2000 feet near Kaidangan. No description is given of his party, but as he mentions occupying part of the day at Bongon in "dividing the travelling stock into twenty-five equal parts," it is presumed that he had twenty-five men with him at starting. The difficulties of the journey from various causes were great. Firstly, want of water, obliging them to carry it in bamboo pipes. Then he had fever badly; and on the 1st June his diary says, "Fancy yourself lying awake with fever, waiting until lassitude will allow you to sleep somehow, and all the night through a score of girls singing at the top of their voices, 'We are going to have pork to-morrow, and pork is what we like.' Such was the situation of my sick companions and my own last night." The following day he says, "Lieut. Hino's place turned into a sick-room. The head of the party came down in a delirium of fever. It is to be hoped the attack on me will not develop into the malignant ague of last year." And then he jokingly adds, "If we are thus comparatively free from the effects of unwonted diet (we live as Dusans) and of climatic exposure, we attribute it mainly to the circumstance that Surgeon Cockle is a spiritual member of our expedition!"

The Labuk river was struck on the 4th June, at Punguh, and ten invalids had to be sent down the river in three canoes which were bought there, Mr. Wittt and the remainder reascending the river. For the next few days many vicissitudes were encountered in the shape of rapids, swamped and broken canoes, &c.; and finally, as they were trying to reach Sebongan to recruit the party's health, they met the Company's steam-launch which had been sent to intercept them, and gave up the original intention of trying to reach the Sibuco. Punguh had been visited by Mr. Pryer in the month of August previous (1880), so that from that point the journey finished through known country.

The geographical information on this journey, though of value and importance to the Company, is not of general interest, except perhaps that Mr. Wittt was convinced "that the position of Mount Kinabalu as given on the Admiralty chart (sheet 2660) is evidently wrong." As this is the most conspicuous mark in the whole country from the sea, it does not seem very creditable to the nation which undertakes to survey any other country's shores, that this point should be unsettled, and emphasises the necessity—so obvious on many other grounds—of sending a surveying vessel to complete the half-finished work of our coast.

Wittt's third and last journey—that on which he lost his life—was undertaken in March 1882, nearly a year after the second. He started on the 9th March from Kimanis, on the west coast, following that river, which is navigable only some 18 miles from the coast, or about the same as the Papar, though the latter is much larger. After fording this river six times, they quitted it for good on the 11th, and continued to ascend

till the following day, when they were 3150 feet above the sea; and on the 14th they reached the watershed between direct (Bangawan) and indirect (Padas) drainage to the westward at a height of 3850 feet, 22 miles south of the pass he had crossed from Tambunan on the first journey, when his altitude was 4700 feet. After striking the Pagalan river he went down it some way, to within some 30 or 40 miles of where he subsequently met his death.

The journal ends abruptly on the 28th March, and was sent to us by the Dutch some time after his death, or rather a copy was, for we never had the original. It is written in excellent spirits, and in more detail than the former ones; but it is evident from almost the first, or at any rate when he reached a place called Limbawan, that he was in a troublous district, and among what the chief himself described as "very wild people." He was strongly advised by this chief (Jeludin) not to go, as there was a feud between his country (Nabai) and Peluan to the south-east.

The Peluan people were on the wrong side of a head-hunting account, having one and a half dead to make up. Jeludin himself was a cold-blooded murderer, and had shortly before refused a slave "on account," as she was too old! However, Wittl writes, "I am determined to see the chiefs of Peluan on my way to the south, or better south-west." Probably it was this determination that cost him his life. On the 25th he writes of the difficulties of "having to act as intermediary in these bloody feuds," one being that the account was not the same on the two sides. The discrepancy in this case to any one in the habit of dealing with accounts seems large, for while, as before said, Jeludin debited Peluan with one man and a half, the Peluans claimed the restitution of sixteen dead, or the equivalent. Let us hope that among other benefits of the Company's rule a better system of auditing has been, or will be, introduced. The geographical information relates almost entirely to the courses, junctions, &c., of the Padas, Pagalan, and other comparatively small rivers in the neighbourhood.

I said the journal which was sent to us ends abruptly on the 28th March, but it must have been kept for over two months more. Mr. Von Donop—as I shall presently show—met Wittl in the early part of June near Limbawan, and he mentions "Mr. Wittl's plan" showing their route, and speaks of the rain being very annoying, "especially to Mr. Wittl, who has to attend to the Survey department of our trip." With Wittl were lost, therefore, more than two months' journals, and sketch-maps. The last heard of him was by a letter written on June 11th, 1882, and dated from "Naloyan, Dalit." It was a reply to one from Governor Treacher, directing him to "defer his journey to Sibuco until a more favourable opportunity." In this letter he gives much interesting geographical information, especially as to his having really discovered the head-waters of the Sibuco when looking for the "sources

of the Kinabatangan's south-western branch." On that trip the central range of Borneo was crossed in lat. 5° N., and long. $116^{\circ} 26'$ E., by a pass, which he named "Dent Pass," and which he calls "an important landmark." And they established, he considers, "that the Dyaks of the Upper Sibuco, like those of the Upper Kinabatangan, depend for their supply of salt, iron, &c., on the overland route (from the west). A road fit for carriage traffic could be opened to those districts from Kimanis (Bangawan)."

Whether this really was the Sibuco or the Upper Kuamut (Pryer's Quarmote) does not seem clear, as there is no such river as the Sibuco known in the interior. "The main stream or principal feeder of it is called Talankei." He was then finishing the examination of the Padas and Pagalan basins, which would take his party back to the central range. He proposed afterwards to settle the doubt as to the Talankei, and concludes by saying "the moment I can no longer doubt it is the Sibuco, I will leave it and try to make the real Kuamut." This still remains unsettled, though some connection between the Sibuco and the place where he was killed seems established, by the fact that his body and such of his effects as have been recovered came down the Sibuco, or some river flowing to the east coast in the territory held by the Dutch.

Between the dates of Mr. Witt's second and third journeys, Mr. Pryer made an expedition up the Kinabatangan river, 150 miles further than any European had ever been. Mr. Pryer was the first resident of the east coast, and he had previously made several smaller explorations in various directions, including that before mentioned, up the Labuk to Punguh. On the 23rd February, 1881, he started up the Kinabatangan in a steam-launch with seven people—all told—and three Sulus towing astern in a gobang. Next day they reached Malapi, "which is the first inhabited place on the river, a depôt for up-country produce, and where some 25,000 dollars' worth of birds' nests are annually brought from the Gomanton caves." Even then it was rapidly expanding, as the "mild, but firm" government was being introduced, instead of the old Sulu style. On the 28th the launch was sent back, and the party—nine in number—took to a canoe, in which, on the 2nd March, they reached the junction of the Quarmote river (Witt's Kuamut) with the Kinabatangan; at which point Mr. Pryer estimated that he had gone 300 miles by the river. On the 10th day they reached Trubok, which was their destination, and where they were received with much rejoicing, and Mr. Pryer "held forth to two or three meetings on the beauties of civilisation." The effect must have been striking, seeing (the diary says) that "the Pangeran (chief) had on green silk trowsers and a yellow silk jacket. Among other costumes, I noticed a red jacket and yellow trowsers, a blue jacket and red trowsers, and other similar strikingly coloured

garments; the material being chintz. I felt rather overpowered by all this magnificence, and was quite relieved when I saw Banjar [one of his own men] come in, garbed in a sky-blue jacket and scarlet trowsers, a yellow sash with a very big kris in it, and a head-handkerchief of many colours, with a tag of it sticking up over his left ear in the most knowing style." The whole scene, coupled with the lecture on civilisation, in about the centre of Borneo (longitudinally), must have been grand! Since that time Mr. Pryer has been home, and has addressed more than one meeting in this country; but I doubt if he ever had an audience so gorgeously attired. He is now continuing his most useful *métier* of pioneer of civilisation, and has recommended Penungah, a little above Imbok, as the best site for his headquarters as Resident of the Interior, so that he will be able to illustrate and enforce the "beauties of civilisation."

Early in May 1882, Mr. Von Donop, now Colonial Secretary, and Mr. Davies, now Resident of the West Coast, made a short journey from Papar to Kimanis; and later the same month, Mr. Von Donop made another journey up the Padas river, over some of the ground visited by Mr. Dobree, but striking further inland; the fifth day he came upon Mr. Wittti, on the Tambunan plain, he (Wittti) being on his last trip. They joined, and travelled together some days, during which they reached an elevation of 7000 feet, and went through much good land. Here they separated, Mr. Von Donop reaching Kimanis two days later. Mr. Von Donop has since made several other trips of more or less importance. In August 1883, in company with Mr. Sanders, a Sumatra tobacco-planter, he went up the Abai river, and passing north of Kinalu, reached Bongon at the head of Marudu Bay, and thence to Kudat. He passed through large tracts of good tobacco land, the best being near Bongon. He also made an expedition from Silam, where we had established the experimental garden recommended by Mr. Dobree, and which was then under his (Von Donop's) charge. Another trip was made along the east coast with Mr. W. Reece, and Captain Beeston, the latter of whom has, by latest advices, just returned from an expedition to endeavour to trace the gold deposits to their source.

In March 1882, the ill-fated Mr. Frank Hatton proceeded up the Labuk river to look for "seven hills of antimony," said to exist there. This was a most interesting journey, lasting nine weeks—1st March to 19th April—and is described with that freshness and close observation which promised so much for the young geologist and explorer whose end was so sudden and tragic. Reaching Punguh, which has been mentioned in the journeys of Wittti and Pryer, Mr. Hatton kept on to the westward on a line somewhat south of that of Wittti's second journey, and visiting several villages previously unknown, as far as Byag, turned north by Wittti's first line at Danao, and followed that line

by Lasas and Bundo to Bongon and Kudat. After this Mr. Hatton spent some months exploring the head of Marudu Bay, and in February 1883, after a bold, but unsuccessful, attempt to reach the Segama river overland from the Kinabatangan, he proceeded up the Segama from the sea to prospect for the gold, as to the existence of which the natives were unanimously agreed. Mr. Beveridge, the companion of all his journeys in Borneo, accompanied him. It was just a year after the journey last recorded that he commenced this ascent of the Segama river; and he mentions the fact in his diary, "Just one year ago left Sandakan for the Labuk." Poor fellow, that very day was to be his last. In the afternoon he wounded an elephant with his Winchester repeating-rifle, pursued him, and at dusk gave up the chase. Walking in front of his men to the boats, he tried to remove a creeper which was across his path with the butt end of the rifle. It went off, and he fell, the bullet having gone through his breast. His sole utterance was to his boy, "Udin, sayia Mati!" (Udin, I die!), and in three or four minutes he expired. A most interesting memoir of this young man has been written by his father.

In April 1883 Governor Treacher, the late Mr. Dalrymple, and Mr. D. D. Daly, then Private Secretary, after searching in vain for edible birds'-nest caves, reported to exist in the Malawallie channel, crossed to Banguay Island, the Company's northern possession. Since that time this island has been settled to a large extent for tobacco-growing, and Mitford harbour has been discovered.

Governor Treacher and Mr. Daly subsequently explored the important birds'-nest caves of Madai and Segalong, south of Silam, on the east coast, and published an interesting description of them.

Mr. Daly's interesting and valuable explorations of the Kinabatangan river on the east, and the Padas river on the west coast, were read here lately, that I only mention them, as this paper would not be complete if they were omitted. From the east side he reached the caves of Obang Obang, and from the west the Pagalan river at Binahi, somewhere between which places Wittti was killed.

On the 26th March, 1885, Mr. Henry Walker, Commissioner of Lands, started up the Segama river to verify the native reports of gold there. He ascended the river about 200 miles, to within some 12 miles of the junction of the Danan river, carefully plotting his course as is seen on the map. He had great difficulties to encounter in heavy rains and rapids very troublesome to navigate, but he succeeded in proving the existence of alluvial gold. His work has since been taken up by Captain Beeston and Mr. R. Sefton—both experienced in Australian gold-fields—who are tracing the Segama river to its source in the hope, which their experience so far encourages us to think is well-founded, of discovering the matrix of the gold found by Mr. Walker in the alluvial deposits lower down the river. Working this alluvial gold is, in favourable localities,

fairly remunerative to Chinese and natives, but it is not rich enough to tempt Europeans.*

Some two or three miles above the confluence of the Danan river, the navigation of the Segama by even the smallest boats is blocked by the Barrier Falls, which Captain Beeston describes as being "three stories high, or perhaps it is nearer the mark to say there are three rapids, each overtopping the other." It is above these falls that Messrs. Beeston and Sefton have been exploring.

Mr. G. L. Davies, now Resident of the West Coast, has added to our geographical knowledge of North Borneo on several occasions, but principally perhaps by ascending and charting the Sugut—an important river running into the north of Labuk Bay on the east coast. Since Mr. Davies's visit 50,000 acres of land in the valley of Sugut have been taken up by a Dutch planter for the cultivation of tobacco. I may add that traces of gold have been discovered there by Assistant-Resident Little.

The problem of connecting Sandakan—the capital—with the Segama gold country, has naturally received much attention ever since the existence of the gold was known. In February 1886, Governor Treacher, accompanied by Messrs. Von Donop and Callaghan, walked across from the neighbourhood of Silam, first ascending for a short distance the Tabanse stream, and crossing the Segama at Sabanta Punguts, and the Kinabatangan at Malapi. Thence, after paddling a short distance up the Menanggutt tributary, they visited the great edible birds'-nest and guano caves at Gomanton, and, descending the Sapagaya river, arrived in Sandakan Bay. The journey occupied about a week, and very hard travelling much of it was. The party had to cross a large swamp, and it was found the route could only be used in the dry season. A track to the Segama has since been opened by Mr. Walker viâ the Lamag tributary of the Kinabatangan, which it is proposed to continue on to Sandakan by the Segaliud river which falls into Sandakan Bay.

The latest journey of which we have the record, was made last year by Mr. Little, the Assistant-Resident before mentioned, who ascended our highest mountain, the Kinabalu, the elevation of which, as marked on the map, he considers 2000 feet too much, though he claims to have reached a higher peak than either Low or St. John. Its position and altitude were fixed by the late Sir Edward Belcher when in H.M.S. *Samarang*, and I doubt the propriety of seriously suggesting a reduction of 2000 feet from his trigonometric determination, on the unchecked authority of a small pocket aneroid not in its first youth, however much one may desire to give credit to the work of the Company's

* Mr. Joseph Hatton has reminded me that the late Mr. Frank Hatton died near where the gold has been since found; that his was in fact the pioneer expedition up the Segama; and that his diary afforded much valuable information to Messrs. Walker, Beeston, and others who followed.

servants. The mountain had been ascended in 1851 by Sir Hugh Low, and in 1858 by Sir Spencer St. John. Neither of these gentlemen, so far as I know, disputed Sir Edward's conclusion. Mr. Little's ascent, whether of 2000 feet, more or less, is well worthy of note. He considers Kinabalu is an extinct volcano, and reports that he clearly made out the view of an enormous crater. His route was from Gaya inland, by the Tuaran river and the village of Kiaw, which he recommends in preference to the Tampassuk river which had previously been taken.

I have now finished the summary of all the journeys which can properly be called explorations, since the country came into the hands of the British North Borneo Company, or ever since the cession of the territory in 1878. Much valuable information and aid in filling-in the map has been given from other sources. In a country so utterly unknown, every step the pioneer takes is a small exploration, every mile from the beach, on land or by river; every shooting or fishing excursion is exploration. The late Mr. Dalrymple, Mr. Mosse, &c., &c., all contributed; while Captain the Hon. Foley Vereker, R.N., Captain Johnson, R.N.—who discovered Kudat harbour—Captain Connor, and Mr. Flint have helped in the nautical surveying part very materially. It is greatly to be regretted, as a very serious drawback to the development of the country, that it was considered necessary to send away the last Admiralty surveying-vessel before she had completed the coast; and that fear of wounding the susceptibilities of the Dutch prevented her from going to our southern extreme on the east side, and correctly fixing the coast there, though the Dutch 'do not hesitate to keep an establishment northward of the river—the Sibuco—which was named as being ceded to us by both sultans.

I hope I have shown the Society that we have by no means neglected the geography of the country. Many of the reports which I have had barely time to skim over to-night are full of interesting information of all sorts, not only geographical, but as to native habits, customs, traditions, and superstitions; the character and quality of the soil, the timber, and other natural products, &c., &c. I will only add in conclusion, that complete *terra incognita* as Borneo is to most English people now, it is not likely to remain so long, but will shortly prove itself one of the best tobacco countries in the world. Last year no less than 130,000 acres of tobacco land were sold to settlers.

My thanks are due to Mr. Treacher, Mr. Daly, and Mr. Forbes for their assistance in making these notes.

After the paper,

Mr. TREACHER (late Governor of British North Borneo) said Admiral Mayne had given an interesting account of North Borneo explorations, and he had made his summary much more generally interesting than he (Mr. Treacher) had conceived possible. He would like to briefly summarise some of the practical results of these

explorations, undertaken so zealously and carried through with so much pluck and energy by the British North Borneo Company's officers. In the first place, the late Mr. Witt, who was their first and perhaps most devoted explorer, settled once for all the vexed question of the existence of the large mythical Kinabalu Lake, which had figured in all maps and charts of Borneo up to his time. The late Mr. Frank Hatton, to whose untimely fate the lecturer had referred, supplemented Mr. Witt's investigations in that quarter, but, visiting it at a different time of year, he found that its flooded condition from the waters of the Linogu or Labuk river gave some little foundation to the ancient tradition of the lake's existence. The most probable explanation, however, is that the district in question is by the natives known as Danao, a word which in their language has, it is said, no particular signification, but in Malay, the language of the coast population, from whom the first travellers would derive their information, Danao means a *lake*. He believed there were accounts of this lake so vivid and so detailed that one would think the writers must have actually seen it: nevertheless, it never existed. Another result had been to break down the Malay barrier which in old days prevented the inland people from coming down to the coast and disposing of their goods to strangers without the intervention of the Malay coast tribes, whose monopoly used to be a very valuable one. This was a result which was having important effects in spreading civilisation and encouraging trade amongst the rude inland tribes. Another result had been the gaining of more accurate information concerning the edible birds'-nest caves—Gomanton, Madai, Sigalong, &c.—the collection of the nests in which was now regulated by Government, and a valuable source of public revenue. Yet another result had been the discovery of the gold-fields of the Segama river, referred to by Admiral Mayne. A curious question, which he thought their explorers may be said to have settled, is that as to the existence of the tribe said to be distinguished by the presence of long caudal appendages. He knew several old Malays, including the late Sultan of Brunei, who firmly believed in the existence of such people, and they described how they made use of little chairs, each of which had a little hole cut in its seat, in which the lady or gentleman inserted his or her tail before settling down to a comfortable chat. Well, their explorers had never been able to come up with that tribe—they had always been told they were a few days' journey further on—and he was afraid they never would come up with them. The *orang-outan*, or wild man of the woods, was not altogether unlike some of the natives in appearance, and has no caudal appendage that he could see, and he did not believe that any of the aborigines had either. It had, too, been proved that none of their tribes had cannibalistic tendencies, as described in the case of some of those in the Dutch portion of Borneo by Mr. Carl Bock, and they did not fatten and eat up their aged parents, as is, or used to be, the constant custom of the Battas of Sumatra. Travelling in Borneo was no joke, as he could say from personal experience, though his travels had been comparatively slight and unimportant. Admiral Mayne had referred to some of the difficulties to be encountered, but he (Mr. Treacher) thought the greatest pests were the leeches and mosquitoes, which had not been mentioned. He really did not know which were the worse—perhaps the leeches, as they went at you by night and by day—the mosquitoes generally gave you a rest in the daytime. On every leaf almost, as you walked through the jungle, you might see a lean, hungry little leech, standing on tiptoe, as it were, looking out for you. You could not keep them out, and your white clothes were soon reddened with blood. It was getting late, and he would not detain them longer. He would only say, in conclusion, that there was a capital staff of Europeans in Borneo, only awaiting the order and the funds to explore in any direction required.

The CHAIRMAN (Sir Rutherford Alcock) said that Admiral Mayne had given an admirable summary of the work that had been done by the North Borneo

Company during the last six years. That Company could not be charged with being idle in the matter of exploration, so far as their means allowed. Professor Flower (whom he saw present) would no doubt join with him in the hope that the Geographical Society would think it worth while to help in the work. The country was rich and flourishing, and he trusted that with the aid of British subjects and the capital that was being employed there, peace and prosperity would be restored. Head-hunting had almost disappeared. He regarded the cultivation of the soil and the extension of the influence of the Company as far more important than finding two or three rivers with gold.

*Lectures on Geography, delivered before the University of Cambridge,
1888.*

By General R. STRACHEY, R.E., F.R.S., President, R.G.S.

LECTURE I.

February 18th.

WHEN the University of Cambridge resolved in June last to accept the proposal of the Royal Geographical Society to provide a lecturer on geography with the aid of funds to be supplied by that Society, a wish was expressed that the appointment should be postponed until the next year; and that the Council of the Society should endeavour to arrange in the interval for the delivery of introductory lectures illustrative of the general character and scope of the instruction in geography, suitable for a University course, which it would in future be the duty of the lecturer to impart.

It is by desire of the Council of the Royal Geographical Society that I have undertaken to give effect to this wish of the University authorities.

After careful consideration, I have come to the conclusion that I should direct attention to the subjects with which instruction in geography should deal, rather than to the form in which it should be imparted. I can profess no personal experience qualifying me as a teacher, nor do I think that much useful purpose would be gained by my offering suggestions as to the method of teaching geography most suitable for students at the University. I cannot doubt that it should be left to the lecturer to select the particular methods which best satisfy himself, and appear to him most appropriate in relation to the general course of instruction pursued at the University.

That the study of geography should have been recognised by our two great Universities, for the first time in the past year, as deserving a place among the subjects which they undertake to teach, no less than

my own presence here for the purpose already stated, are sufficient indications that there have hitherto been no very precise notions of the position of geography as a branch of knowledge susceptible of scientific treatment, nor indeed as to its deserving any special attention apart from its utility in supplying various branches of study with topographical facts. Hence the view of the matter which I purpose to place before you must be understood as representing only my own personal opinions, though I have every reason to think that, in substance, the same opinions are held by all those, both in this country and elsewhere, best qualified to be your guides.

Geography has till a comparatively short time ago been commonly viewed rather in the light of its practical value in supplying maps of the world, and of the interest that attaches to the exploration of unknown countries, than in relation to other branches of knowledge, or to the general body of physical science. The function of the geographer was conceived to be to delineate in maps, and to describe the forms, relative positions, and physical and political characteristics of all parts of the earth. It is this branch of the subject that has been most fully carried out, and to it the notion of geography is still popularly restricted. The more obvious facts for geographical observation are such as strike the least instructed, and the first steps were taken by those who had necessarily little appreciation of the true significance of much that they saw, and were incapable of doing more than collect, and that very imperfectly, the materials which their successors are bringing into a scientific form. The present generation has almost lost remembrance of the thrilling interest created by the accounts of those geographical discoveries which were among the glories of the past two or three centuries, and the standard volumes of voyages and travels, which delighted the boyhood of their elders, now lie forgotten or neglected by the youth of to-day. A new phase of thought has become operative. The connection between geography and physical science is more distinctly recognised, and attention has been especially drawn to the value of geographical knowledge in relation to the ordinary affairs of man, and to the importance of extending such knowledge. There is a clearer appreciation of the influence which geographical features and conditions have exerted on the past history and present state of the several sections of the human race, on the foundation and growth of kingdoms, the development of industry and commerce, and the spread of civilisation.

The growing sense of the importance of geography in all these aspects has led the Royal Geographical Society for many years past to make continuous efforts to secure for the study of geography a more prominent place in general education; and in order to bring about a more satisfactory system of instruction in our schools, it has sought and obtained

from the Universities of Oxford and Cambridge the recognition of this study as a subject that should fall within the range of their teaching, and for which suitable provision will accordingly be made.

In its earliest shape, geography, as I have already observed, concerned itself chiefly with the mere topographical features of the surface, and viewed the earth almost exclusively as the habitation of man. The inquiries it made were directed to the distribution of the land and water, the positions of the continents, islands, and seas, and of the plains, mountains, and rivers; to the manner in which the land was divided into various countries, and occupied by various nations; to the divisions of countries into provinces, and the situation of the chief cities. The geographer further took note of matters concerning the language, customs, and modes of government of the inhabitants, as well as of the climate and products of the various parts of the earth.

By the gradual extension of observation, and the ultimate adoption of true notions as to the form and magnitude of the earth, the more serious errors of the earlier approximate ideas were corrected, and at length a solid foundation was laid for precise determinations of position, and accurate delineation of form in detailed maps. And as knowledge thus advanced, the earlier impressions of travellers, based on the striking differences between distant countries, were supplemented by the perception of co-existing similarities no less remarkable and real. Attention was soon drawn to the peculiarities which persistently characterise the great regions of polar cold and equatorial heat; to the main features of the mountain ranges, the plains, the coasts, and interior of the continents, and of the oceans; to the local and periodical variations of temperature and climate; and to seasons of wind and rain over certain areas of land and sea.

At a later period, the grouping of plants and animals of peculiar structure or of peculiar families in certain terrestrial or marine areas attracted attention, and fresh occasion for observation and thought was found in the circumstances under which such groups varied from place to place, or reappeared, more or less completely, under identical or similar forms in widely separated regions, or were more or less strictly limited in number or in respect to the areas over which they were found. Combined with these facts, and studied with them, were the analogous physical peculiarities of the races of man, their languages, customs, and history, varying from one region of the earth to another, yet often having certain common features over large areas.

But before these observations could be viewed as parts of a connected whole, or the true significance of their mutual relations could be properly appreciated, it was necessary that considerable progress should have been made in many special branches of physical knowledge. The ancient sciences of mathematics and astronomy had first to receive the additions which followed the revival of learning in the sixteenth century; the

modern sciences of chemistry and physics, biology and geology, had to be created, and the study of history to be placed on a more scientific basis; and all had to throw their light on the facts brought together from many lands and seas to make a truly scientific conception of geography possible.

Science, whether applied to geography or any other subject, being, in truth, nothing more than well-arranged knowledge, its methods, though first developed by the study of mathematics and of the physical forces of nature, are applicable to all the objects of our senses and the subjects of our thoughts. The foundation of all knowledge is the direct observation of facts; by applying thought to the facts thus observed, we seek through a process of classification and comparison for the causes of which observed phenomena are the results, and the conclusions thus obtained constitute science.

The aim of geographical science, therefore, is to investigate and delineate the various features of the earth; to study the distribution of land and sea, the configuration and relief of the surface, position on the globe, and so forth, facts which determine the existing conditions of various parts of the earth, or which indicate former conditions; and to ascertain the relations that exist between those features and all that is observed on the earth. Geography is thus ancillary to many other branches of science and learning, for which a knowledge of the relations of the matters with which they deal to such facts or features is essential.

It is evident that the investigation of the causes of terrestrial phenomena, embracing as these do all animate as well as inanimate nature, requires a knowledge of physical science both wide and deep. But though this be true, it puts no serious difficulty in the way of imparting a thoroughly sound general or elementary knowledge of results already attained, to those who from want of leisure, or perhaps of capacity, are unable to extend their knowledge further. Nor need such acquaintance with the subject be either superficial or of small value. In every branch of learning the student has to rely on the researches and conclusions of those who cultivate other branches of knowledge. In this respect geography in no way differs, except in degree, from other natural sciences, in all of which, it is found that, as knowledge increases, the subject-matters proper to each are necessarily involved with those constituting the special subjects of investigation in other fields. From the great extent of human knowledge, the special branches into which it is divided have become very numerous; and from the rapid progress in recent times, the difficulty of prosecuting original research in more than a single branch is so much increased, that it becomes continually more important to obtain in a connected form the best possible view of the aggregate result obtained. It is the aim of scientific geography to supply this, as regards all the phenomena observed upon the earth, so far as they depend upon the material globe, position upon it

and the features of its surface; and to this end I think the teaching of the University should be directed.

It will of course be understood that it is to persons who have acquired a sound elementary knowledge of the subject, such as is required by the University in all other branches of study, that the teaching now contemplated will be offered. Objections to including scientific geography in the course of an ordinary school education, founded on the variety and complexity of the subjects it involves, may without hesitation be discarded. These objections have, in truth, had their origin in the too general absence of scientific knowledge which characterised a generation that had not itself received even an elementary education in physical science, and which stood much in the same position in regard to these matters as that in which men who can neither read nor write stand in regard to the world of letters; such views will no doubt be abandoned as more rational methods of education are adopted.

But it cannot be too emphatically stated that this preliminary training in scientific geography, to be effectual, must be founded on, and combined with, thorough instruction in the general topography of the globe. It appears to me that there is some risk at the present time of this important consideration being lost sight of, in the reaction that has set in against the merely formal system of teaching geography in our schools, through lists of names, involving little more than ill-directed efforts of memory. I desire, therefore, to express a very decided opinion that no greater mistake can be made in the interests of education than to treat the teaching of elementary geography as supplying the occasion for giving indiscriminate instruction on the various phenomena of which it affords illustrations, and to which it is thus virtually made to appear subordinate. It should be so conducted as to impart an accurate knowledge of the main topographical features of the entire earth, with a judicious addition of suitable instruction in the physical, economical, and historical characteristics of the various places, whose positions it is important to impress on the memory of the pupil. The acquisition of really useful knowledge in the necessarily limited time that can be devoted to elementary teaching in geography will assuredly be much facilitated by avoiding trivial details which have neither educational nor other value, but which I fear constitute too large a part of the so-called geography found in our school-books and taught in our schools; and it should never be lost sight of that correct ideas cannot be conveyed to the learner without constant reference to maps illustrated by frequent use of a globe.

The extended scope of geography, as I have defined it, seems to me to afford no sufficient reason for abandoning that well-known name and applying to the enlarged field of study that I would throw open any other designation than the old honoured one of geography. I am not to be understood as implying that the study of geography requires the simul-

taneous or complete mastery of all the branches of knowledge, physical, biological, historical, or economical, with which it has relation, or that the teacher of geography should attempt to include them in his course of instruction. It is obvious that it is only within certain restricted limits that these subjects come into contact with geography. My contention simply is, that so far as the results obtained through the study of such special subjects indicate an interdependence between the physical features of the earth and what occurs upon it, that relation should be constantly recognised as falling within the province of geography. For reasons which I shall endeavour to develop more fully as I proceed, I am unable to draw any hard and fast line between the material earth and its manifold attributes; and much that is found upon the earth cannot be properly understood otherwise than in relation to its geographical and topographical features.

I therefore claim for geography, in the sense that I have spoken of it, a place among the natural sciences as supplying the needful medium through which to obtain a connected and consistent conception of the earth and what is on it, on the importance of which I have already insisted. In this respect the position of geography may be looked on as analogous to that of mathematics, a term to the use of which I never heard an objection, though it is hardly possible to limit the extent of its range; and, following this analogy, it may be convenient to give some such designation as Applied Geography to the outlying portions of the subject which connect it with other independent branches of knowledge.

In proceeding now to place before you in a succinct form a connected view of the matters lying within the range of scientific geography and which would supply the subjects for University teaching, I shall first direct your attention to the manner in which our knowledge of the form and magnitude of the earth has been acquired, and the gradual extension of geographical exploration has taken place. I shall then pass to that part of the subject which treats of the manifold phenomena exhibited by our planet, and its aerial envelopment, all of which are determined, first, by the action of the great physical forces, attraction and heat, controlled by the earth's figure and its movements on its axis and round the sun; and secondly, by the distribution of the sea and land, and the configuration of the surface of the latter, above and below the sea-level. Finally, I shall touch upon the relations of vegetable and animal life with past and present terrestrial features, and on the influence of geographical conditions on man.

The intimate relation between geography and astronomy is at once indicated by the dependence of the geographer on the latter science for a knowledge of the methods of determining the magnitude and true form of the earth, and of ascertaining position on its surface.

It is of the highest interest to contemplate how man, many centuries ago, with instrumental appliances of the rudest description, and with no other aid than his wonderful reasoning faculty, deduced from observations of the apparent motions of those heavenly bodies from which an impassable gulf divides him, the figure and dimensions of the globe on which he stands, of which he had as yet seen but a very small part; and how he thence extended this knowledge to the magnitude, the distances, and the laws that regulate the movements, of all parts of the planetary system to which the earth belongs.

Leaving the obscure origin of conceptions on these subjects to be sought for in Babylonia or Egypt, it is to Greece that we turn to find the first definite scientific opinions. Thales of Miletus, 640 years before the Christian era, already taught that the earth was a sphere. To his successor, Anaximander, is attributed the invention of maps; and Pythagoras, the disciple of Anaximander, is believed to have suggested the true doctrine of the revolution of the earth on its axis and round the sun, though this conception, which is described by Cicero in very clear language as having been adopted by the school of Pythagoras established in the Greek colonies in Italy, dropped out of sight for centuries.

Eratosthenes, of the Greek school of Alexandria, in the third century before Christ, executed what was probably the first measurement of the magnitude of the earth, adopting for the purpose, in principle, the method still in use. He observed the sun's meridional altitude at the time of the solstice both at Syene and Alexandria, which are nearly on the same meridian, and thence deduced the angular distance of the zeniths of those two places, which represented the arc of the terrestrial meridian between them; from which, knowing their distance from one another measured in stadia, the standard in use in his day, he calculated the length of the entire terrestrial meridian, and the earth's radius, in terms of his standard, our ignorance of the exact value of which, however, prevents our knowing what degree of accuracy he attained. This astronomer also first determined the obliquity of the ecliptic, or the angle made by the plane of the earth's equator with that of its orbit, thus supplying the key to the cause of the succession of the seasons of the year.

Hipparchos, of the same school, who lived a century later, was the greatest of the Greek astronomers, and his additions to the science were truly remarkable. He discovered the precession of the equinoxes, or the periodical change of direction of the earth's axis from east to west, in the opposite direction to its motion in its orbit; also the eccentricity of the sun's apparent orbit, and the inequality of its motion, and he calculated its distance from the earth. To him are due the methods of calculating triangles, spherical as well as rectilinear, the system of fixing geographical position by means of latitude and longitude, and the method of calculating longitudes from eclipses of the moon.

An interval of three hundred years followed which records little progress calling for notice. It is, however, marked by the rectification of the Roman calendar, by the introduction of the leap year, carried out by Julius Cæsar, with the aid of an astronomer of the school of Alexandria; and the recognition of the dependence of the tides of the ocean on the apparent movements of the moon and the sun, attributed to Posidonios.

Ptolemy, about 150 A.D., was the last eminent man of this school. He adopted the sound principle of constructing geographical maps or charts from latitudes and longitudes, determinations of which for all known places he tabulated with this object. But these data were to a great extent vague and inaccurate; and his results, though given a scientific form, did not rest on any scientific basis. He is better known, however, by his treatise on Astronomy, the *Μεγάλη Συντάξις*, which long continued to be the great authority on such subjects, and which caused his name to be given to the conceptions of the solar system it contained, though these were really due to his predecessors. He taught that the sun, moon, and planets moved round the earth in what is known as a system of epicycles, the several bodies revolving in circular orbits round centres, which in turn revolved in circles round the earth—a view which was accepted till the time of Copernicus.

From the time of Ptolemy until the sixteenth century, a space of 1400 years, no progress of any importance was made towards the formation of correct ideas of the relation of the earth to the celestial system to which it belongs. The study of astronomy was revived, however, in the ninth century after Christ, among the Arabs. Al-Mamun, the son of the famous Khalif, Harun-al-Rashid, caused the treatise of Ptolemy to be translated into Arabic, in which shape it became known as the *Almagest*; he also undertook the measurement of a degree of the meridian on the plains of Mesopotamia; and it was mainly through the teaching of the schools established by the Mahommedans in Spain, and thence transmitted to Italy and diffused in Europe, that the knowledge already acquired was retained and eventually so vastly extended.

The revival of learning, and the material progress of the States of Europe during the thirteenth and subsequent centuries, gave a fresh and powerful impetus to the spirit of investigation and exploration that had so long remained in abeyance, and were followed by a remarkable series of scientific and geographical discoveries.

A little after 1500 A.D. Copernicus put forth the view, this time to be finally accepted, that the earth and planets move round the sun. The discoveries made almost simultaneously by Galileo and Kepler at the commencement of the seventeenth century, completed and corroborated this theory, and so opened the way for that explanation of the whole series of astronomical phenomena by the operation of the law of

universal attraction, which is due to the genius of Newton, and which was published in the 'Principia' in 1687.

A great impulse was given to precise geographical knowledge by the invention of the telescope by Galileo, by the application of the pendulum to clocks by Huyghens, and of spiral springs to watches by Hooke. The employment of these instruments supplied the means for greatly increased accuracy in astronomical and geodetic observations, while the invention of logarithms by Napier, 1614, was a most important aid to progress by facilitating all computations. More exact determinations of the dimensions and figure of the earth soon followed.

The measurement of an arc of the meridian near Paris by Picard, 1669, with the help of improved instruments, furnished for the first time with telescopes, led to attempts to verify, by actual measurements, Newton's theory of gravitation, as applied to the form of the earth and its attractive force.

For this purpose the French Academy, in 1735, sent out expeditions to Quito, on the Equator, under Bouguer and De la Condamine, and to Lapland within the Arctic circle, under Maupertuis. The measurements thus obtained were supplemented by Lacaille at the Cape of Good Hope in 1752, and those originally made by Picard were repeated and extended. The operations thus carried out finally established the fact of the earth's ellipticity, by means of combined geodetic and pendulum observations; the former showed the smaller length of a degree of the terrestrial meridian at the Equator and its gradual increase in advancing towards the poles; and the latter proved the increase of the force of gravity at the surface with increase of latitude, as indicated by the time of vibration of the pendulum, which increases or diminishes as the distance from the earth's centre is greater or less. Nothing then remained to be done in this direction but to attain results of greater precision, by the employment of better methods in detail, and of improved instrumental appliances.

The geodetic operations commenced by the French Academicians were extended to England in 1783: since which time many other arcs of the meridian and of circles of latitude have been measured in Europe, Asia, and America; and geodetic surveys of great accuracy have been extensively carried out, forming the basis of most modern maps.

The dimensions of the earth, adopted by our latest, and I believe our best authority, General Clarke, are as follows:—Polar radius, 3949·79 statute miles; equatorial radius, 3963·30 statute miles; ellipticity, $13\cdot51$ statute miles, or $\frac{1}{293}$. The radius of the mean sphere approximating most closely to the ellipsoid is 3959 miles; its diameter is very nearly 7920 miles, and the length of a degree on such a sphere is $69\cdot09$ miles.

The exact determination of the figure of the earth, and of the relative positions of places on its surface, on which the accuracy of all delineations of its features in maps depends, is a task involving many

difficulties and calling for rare abilities in the geodetic surveyor. It is not likely that the results obtained from the measurements already made will be found to require any but very slight correction hereafter, and future variations will probably represent little more than discrepancies due to actual irregularities in the figure of the globe, which often bear a by no means unimportant ratio to the deviation of the elliptical from a spherical form, the difference between the equatorial and polar radii of the terrestrial ellipsoid being only about $13\frac{1}{2}$ miles.

Among the causes of the uncertainty that attends such measurements, other than those just referred to, one specially calling for notice is the variation of the direction and force of gravity, due to local attraction by mountains, or to variations in the density of the interior of the earth. As variations in the force of gravity depend not only on distance from the centre of the earth, but also on the greater or less density of the interior, difficulties arise in distinguishing between the effects of these two causes. The facts observed have led to the conclusion that gravity is invariably greater at coast than at inland stations, and greater on islands than on the coasts of continents. The greater density below the ocean-bed thus indicated is, moreover, associated with less density among mountains, for the deviations of the plumb-line from the vertical caused by mountains are found to be considerably less than would be due to local attraction, unless the mountain density be less than that of the earth's crust below.

The want of uniformity in the earth's figure is not confined to the solid surface, but necessarily extends to the ocean surface, which must be affected by the local variations of attraction, though the exact amount of the disturbance will apparently remain unknown, at least to a great degree. It has been calculated that, under certain assumed conditions as to the relative density of the sea and land, the effect of the absence of land between the Indian Peninsula and the South Pole, combined with the attraction of the Himalaya Mountains, and the high land of the Peninsula, would be to raise the level of the sea surface at Karachi as much as 500 feet above that at Cape Comorin. The conclusion cannot be avoided, that measurements of heights above the sea-level as commonly stated, though fairly comparable one with another over a limited area, are subject to no little uncertainty if regarded as absolute quantities referred to the ideal sea-level of the mean terrestrial ellipsoid.

The conceptions of the Greeks as to the form of the earth, and the manner of determining position on its surface, were for many centuries very imperfectly applied to the preparation of maps. Methods of calculating latitude, and instruments suitable for applying these methods, were comparatively soon devised. The difficulty of obtaining differences of longitude was far greater, and could not be completely

overcome until correct clocks were constructed. The determinations of latitudes were slowly accumulated, while those of longitude remained extremely imperfect. So far as is known, there would appear to be only one map now existing attributable to the period of Imperial Rome, referred to the third century, though itineraries in a graphic form were in common use. The Arabs added something to the art of map-making between 800 and 900 A.D. The use of the magnetic needle for navigation is believed to have been first generally adopted in Europe about 1200 A.D., and it was about the middle of the thirteenth century that "compass" maps were devised, the earliest representing the Mediterranean, showing the bearings between various maritime stations, and indicating the courses to be followed in sailing from one port to another. The idea current in the Middle Ages, that the inhabited earth was circular, much impeded progress in the preparation of correct maps. This has destroyed much of the value of the great map of Fra Mauro, 1459, now in the Ducal Palace at Venice. The most remarkable and almost unique attempt to represent the then known facts of geography, without such theoretical distortion, is the Catalan Map in the French National Library, dating from 1375. Lines of latitude and longitude are believed to have been first introduced upon maps by the Portuguese, when voyages in the Atlantic began to be frequent, probably between 1400 and 1500. The earliest printed map appeared in 1460, following the invention of printing, and by 1500 maps had become common. The first maps seem to have been brought to England in 1489, and almanacks were first printed in 1470.

The construction of charts on Mercator's projection, invented by Gerhard Kramer in 1537, and improved by Wright, who substituted for the original approximate method a strictly correct graduation of the arcs of latitude along the lines representing meridians, may be regarded as the commencement of scientific map-making, and it rendered possible a very great advance in navigation. The charts thus drawn were adopted by navigators generally by 1600, and have continued in use without modification to the present time, nor do they seem to be susceptible of improvement for the purposes of the seaman.

The first treatises on navigation appeared about 1537 in Portugal, and 1580 in Hungary, and they were introduced in England by Wright in 1600, in which year also the use of the log for measuring the speed of ships was invented, and a knowledge of the variation of the compass was acquired soon after. Up to this time the only instruments used at sea for astronomical observations had been the cross-staff and astrolabe; with the former, angular distances from the horizon could be obtained only by looking in two directions, and with the latter by help of a plummet. The invention of the reflecting quadrant by Hadley in 1730, when perfected by the application to it of the telescope, the vernier, and the accurately divided circles which the progress of

mechanical art provided, and further supplemented by improved time-pieces, placed at the disposal of the navigator all that he needed to enable him, in fixing his position at sea, to apply the methods of computation with which the astronomers supplied him. Maskelyne in 1763 perfected the method of obtaining the longitude by measuring distances of the moon from stars, and the publication of the *Nautical Almanac*, also due to him, commenced in the year 1767. It was in 1760 that Harrison received the sum of 20,000*l.* for the successful construction of a chronometer suitable for use at sea, and capable of supplying a reliable measure of changes of longitude by means of a comparison between its indications and local time. For this, great accuracy was essential, a difference of $3\frac{1}{2}$ seconds of time corresponding to a distance in longitude of about one statute mile at the Equator, and half that distance in latitude 60° . In this manner was attained the long-sought solution of the most difficult problem of navigation, to obtain which large rewards were for many years publicly offered.

The science of navigation was thus created and matured, by the help of the discovery of the telescope, and the progress of mechanical art, which produced instruments capable of measuring angular distances and time with great precision. It has supplied the means by which in our time the skilful mariner passes to the most distant parts of the globe in complete security, at a speed which now makes every part of the habitable seaboard, however remote, more accessible than were many places in our own islands hardly a century back.

But to admit of such triumphs, the accurate representation of the features of the earth's surface by charts or maps was essential; and the representation in a rigorously accurate manner on a plane, such as a sheet of paper, of a figure drawn on a spherical surface, being necessarily impossible, much ingenuity has been applied in devising the best methods for approximating to the truth.

Reference has already been made to Mercator's projection of the sphere. On this system the meridians are all drawn parallel to one another, the circles of latitude being represented by straight lines parallel to the Equator and at right angles to the meridians. The graduation of the meridians is so arranged that everywhere on the chart the proportion between the length of a degree of latitude measured on the meridian, and of longitude measured on the lines representing circles of latitude, is the true proportion as it actually subsists on the globe. It follows from this construction (and this constitutes its special utility to the seaman), that a straight line drawn in any direction on the map represents a course on the globe which everywhere cuts the meridians at the same angle; so that the course of a ship may at once be laid down on the chart, or any given bearing, and will be correctly represented by a straight line drawn with the required inclination to the meridian through the place from which the ship starts. Upon any known course

and for a run of any given length, the difference of latitude between the point where the run began and that where it ended, may be obtained, by the help of tables prepared for the purpose, and thus the position reached may readily be marked on the chart.

For other purposes than those of navigation this projection is likely to be extremely misleading. The degrees of the meridian, instead of being uniform in length, as they would be on the scale to which maps can be drawn, appear to increase with the latitude, till at the pole they become infinite; while degrees of longitude measured on the small circles of latitude, instead of diminishing in the higher latitudes, and vanishing at the pole, are made to appear constant, and everywhere equal to degrees of the Equator. Hence the magnitudes of all parts of the map in the higher latitudes are very greatly exaggerated in relation to the equatorial regions, which alone are in proper proportion, and the non-convergence of the meridians leads to great misrepresentations of true relative position.

This projection must indeed be looked on rather as a diagram prepared for a special purpose than as giving even an approximately true representation of the earth's surface. In this respect, however, it differs only in degree or manner from some projections in use, by aid of which attempts are made to represent large areas, such, for instance, as that employed to exhibit the earth in two hemispheres. Other projections are in the nature of perspective drawings, and are therefore necessarily faulty in the sense of their topographical accuracy.

On the whole, the method easiest to follow, and usually open to fewest objections, appears to be that known as the conical development or projection. In this the surface of the part of the sphere to be represented is supposed to be covered by a conical surface, which cuts the spherical surface along two small circles of latitude intermediate between the upper and lower margin of the area to be dealt with. Places on the sphere are then represented on the conical surface by the intersection of that surface with lines drawn from the earth's centre through those places. The meridians appear as straight lines converging to a point, and the circles of latitude as arcs of concentric circles everywhere intersecting the meridians at right angles. The supposed conical surface being then conceived to be unrolled, supplies a map on a plane in the usual form, while if bent into its proper conical shape it will represent, within the limits that are possible for a flat surface, the true relative positions of places on the spherical surface.

Many more or less complicated methods have been devised for adjusting the supposed conical surface to the portion of the sphere to be represented, in the manner which shall lead to the least possible distortion or local exaggeration. But there is not much, if any, reason to prefer any of these to an arrangement which assumes the cone to cut the sphere in two places, respectively half-way between the extreme north

and south ends of the central meridian and the centre point of that meridian.

A convenient modification of this development is the following:—The degrees of latitude are to be set off along the central meridian upon any desired scale, and of uniform length, and the meridian-lines are then to be drawn so that arcs of longitude measured along the circles of latitude described through the points where the cone cuts the sphere, as before stated, shall have their true length in relation to the arcs of latitude. If L , and l , represent respectively the latitudes, expressed in degrees, at which the conical surface is supposed to intersect the sphere, then the distance of the centre of the concentric circles of latitude to be drawn on the map, measured from latitude L along any meridian, and expressed in degrees, will be

$$(L - l) \times \left(\frac{\cos L}{\cos l - \cos L} \right).$$

On such a projection the aggregate error is a minimum; distances measured from north to south would everywhere be correct, while the errors in those measured from east to west on a map embracing the whole of England would not exceed fourteen feet in a mile in latitude 50° , or seventeen feet in latitude 60° , both being in excess of the truth. In a map of Europe, extending from latitude 70° to 35° , the error in measurements in the direction of longitude would be about five per cent. at the top of the map, and three per cent. at the bottom, both in excess, and on the middle latitude about one per cent. in defect.

For maps of the Polar regions another projection is most convenient. The meridians converge to the pole, and the circles of latitude are drawn concentrically around the pole. Degrees of latitude are measured uniformly along the meridians. The errors of distances measured on the circles of latitude are about 3 per cent. in excess at latitude 60° , and about 10 per cent. at 45° .

Much still remains to perfect the method of representing mountain features on maps. The conception of indicating the relief of the surface by contours drawn along lines of equal altitude above the sea-level, is understood to be due to Laplace, and is admirably well suited for many purposes. The ordinary system of shading with short transverse lines is difficult of execution, and fails properly to distinguish such features as elevated plateaus. A method, recently adopted, of indicating altitude by a gradation of shades of colour, the borders of the shades following suitable contour-lines of level, appears to furnish the best solution of the difficulty yet proposed for maps to which it is possible to apply it.

And here let me dwell for a moment upon the very great practical value of those compendious contrivances for conveying information to the mind, diagrams and drawings, which are little, if at all, less valuable than written language. Their special power consists in bringing clearly

within the reach of apprehension, at the same moment and in suitable juxtaposition, numerous objects interdependent but different, and so producing an intelligent connected conception of the whole, often without effort, and always with a clearness that no verbal description could secure. I desire to invite particular attention to this subject, feeling assured of the high utility of the graphical representation of facts in dealing with the many complicated phenomena that present themselves to the scientific student of geography. To comprehend maps or diagrams is within the reach of all, and a certain fair facility for making them may be acquired as readily as the art of writing. Man has long been distinguished from other animals by the faculty of speech; he is also the only drawing animal. These faculties correspond with the two ultimate modes by which it is possible for ideas to be communicated apart from actual experience, and he who possesses and exercises both, vastly increases his power both of acquiring and imparting knowledge.

Note on the Map of Lycia-Pamphylia.

By Professor W. M. RAMSAY.

IN his explanations of the map drawn by him for Benndorf-Niemann's 'Lykia,' p. 21, Prof. H. Kiepert mentions that the surveys made by the various members of the two Austrian expeditions to Lycia and Pamphylia oblige him to give a more southerly situation to the frontier district of Lycia and Pamphylia than that given by Admiral Spratt in his map attached to Spratt and Forbes's 'Travels in Lycia.' Starting from the fixed coast-line, the difference of latitude becomes 1' at Elmalı and 3' at the peaks of the Rahat Dagħ. Prof. Kiepert proceeds to say that the doubt may hereafter be decided by a route starting from the north and passing by the Rahat Dagħ. In a footnote he mentions the prospect that the doubt may be resolved very soon by the results of the expedition made in 1884 by the Asia Minor Exploration Fund.*

I drew out the map of this journey in the winter of 1884-5; and my map, drawn solely from the observations of the expedition, without any reference to either Kiepert's or Spratt's map, agreed closely with Spratt's results. There were, however, some uncertainties in my map. Starting from the Lycus valley, the long valley, Kara Eyuk Ova, which extends from the foot of Khonas Dagħ, in a S.S.E. direction, and across which I zigzagged several times, was kept fairly certain by the peak of Khonas Dagħ, which was constantly in sight. We had then to cross into the long valley of the Gebren Su, which extends from south-west to north-east; in doing so I went a circuitous route by the easy level road passing round the southern end of the mountains bounding the east side of the Kara Eyuk Ova, while my companions, Mr. A. H. Smith and Mr. J. R. Sterrett, crossed the mountains from two different

* "Während diese Zeilen zum Druck gehen, werde ich durch eine Mittheilung überrascht, welche bereits für nächste Zeit die Erfüllung des hier ausgesprochenen Wunsches in Aussicht stellt. Auf der Rückfahrt von seiner dritten Forschungsreise in Kleinasien besuchte mich Mr. Ramsay, der soeben u. s. w. Die bereits unterwegs begonnene zu Hause in nächster Zeit zu vollendende Ausarbeitung seiner Itineräre wird bald neues Licht über die den nördlichen Rand unserer Karte einnehmende Landschaft verbreiten."

points in the Kara Eyuk Ova straight into the Gebren Su valley. I hoped that these three routes would fix the relative situation of the two valleys; but the result was unsatisfactory. Neither of the routes over the mountains gave any distant readings to the two valleys, and I was obliged to depend solely on my own circuitous route, in which dead reckoning by timing the pace of a horse, played a greater part than I could have wished.

Circumstances prevented me from travelling in 1885, but in 1886 I again visited the Gebren Su. This time I entered the valley from the north, and I again drew the map from an entirely new set of readings. I found that I had now placed Tefenni, the chief town of the valley, about 1800 yards N.N.E. of its position in my first map.

The second map was drawn in a different way from the first. The first was drawn entirely by compass readings and reckoning by time taken from a horse's pace. The second was plotted solely by compass readings. Mr. E. Purser, manager of the Ottoman Railway, gave me a copy of a survey made along an eighty-mile line eastwards from the Lycus valley; this survey was made from compass readings and measurement by the number of revolutions of a wheel: it included three lofty mountain peaks, Khonas Dagb, Yan Dagb, and Ai Doghmush Dagb. I ascended several lofty points in the Gebren valley, and fixed them, at the western end by readings to Khonas and Yan Dagb, at the eastern end by readings to Yan and Ai Doghmush Dagb. This second map depends therefore entirely on the accuracy of the railway survey, and the fact that it differs so slightly from the previous map permits a certain degree of confidence in the accuracy of both.

I should add, that the second map was drawn day by day on the journey, according to the day's observations. If I had had time to draw it again with more accurate instruments, and at greater leisure, it might be slightly modified, but not sufficiently to affect the following statement materially.

In order to make the following comparison with older maps, I placed the lines of latitude and longitude on my map, using the map of Kiepert as my guide and authority. I did not, however, modify my map to suit the conical projection according to which the lines of latitude and longitude are drawn. I made the north and south lines of my map coincide between $29\frac{1}{2}^{\circ}$ and 30° of longitude with the ruled lines of longitude given me by Mr. Sharbau of the R.G.S.; this is about the middle of my map. This, of course, produces a difference of a few seconds in the latitude of places at the east and west sides of my map; but the difference is too slight to affect the following table, which therefore represents fairly the real value, whatever it may be, of my map as a criterion between the variations of previous observers. In the following table I give in the first column the latitude of a number of places in my own map, in the next the latitude of as many as have been observed astronomically by Wrontchenko, Hamilton, and A. H. Smith (who travelled with me in 1884). Where no observations for latitude are available, I give the position on the maps of Spratt and Kiepert.

For the whole of Wrontchenko's observations here given, I am indebted not to the published source, which is not accessible to me, but to the kind communication of Prof. H. Kiepert.

With regard to longitude, I agree best with Kiepert in places which are reached by a direct and straight route from the coast, such as Kizil Kaya Bazar; in the intermediate country the discrepancy is sometimes considerable, though not so great as in latitude, while the north-west (which I made the initial point for estimating latitude and longitude) and the eastern sides agree very well.

In this table the first two points, Kizil Tash Dagb and Kizilje Dagb, lie outside of my map, but are placed by distant readings from places in my map. Kizil Tash

Dagh is visible from the extreme northern limits of the Kara Eyuk Ova, and also from elevated points in the Gebren valley near Karamanli and Kaljik. Kizilje Dag is visible only from one or two points within my map. I place it according to a 45 miles reading from north-east, two readings from north-west of 35 and 30 miles, and a reading from a nearer point almost direct north.

	Latitude.						Longitude.			
	Ramsay.	Kiepert.	Spratt.	Smith.	Wron- tchenko.	Hamilton.	Ramsay.	Kiepert.		
	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "
Kizilje	36 56 30	36 53 50	36 56 0							
Dagh ..	37 2 20	37 4 32	37 3 0							
Kaziltash	37 4 45	37 3 45	37 4 10							
Dagh ..	37 8 0	37 4 24	37 7 30							
Istanosz ..	37 14 30	37 17 30	..	..	..	..	29 36 25	29 38 0		
Lagbe ..	37 18 45	37 18 32								
Teham Keui	37 19 30	..	..	..	37 17 24					
Kazil Kaya	37 15 5	..	..	37 13 53						
Bazar ..	37 17 15	..	..	37 16 0						
Tefenni ..	37 24 30	..	..	37 24 6						
Audia ..	37 29 10	..	..	37 29 18						
Fougla ..	37 38 40	..	..	37 36 1						
Kestel ..	37 52 30	..	..	..	37 52 0					
Geulde ..	(?)	..	..	..	37 45 18	37 45 15				
Dere Keui	37 29 20	..	..	..	37 31 0					
Egerdir ..	37 42 50	..	..	37 44 18	37 42 24	37 42 45				
Sparta ..	37 42 10	..	..	..	37 54 42					
Kara Eyuk	37 54 5	..	..	..	..	38 3 0				
Bazar ..	38 3 10	..	..	..	..	37 43 48				
Buldur N.	37 43 20	..	..	..	..	37 45 0				
Buldur S.	37 45 10	..	..	..	..	38 0 30				
Bolatli ..	38 0 55	..	..	..	38 3 12					
Dineir ..	38 0 50	..	..	..			
Khonas ..	38 18 10									
Denizli ..	38 4 15									
Tripolis ..	38 38 55									
Bulladan..	38 41 40									
Ishekli ..										
Demirjik..										
Ushak ..										
Aflom K. H.										

The third point in the table, Istanosz, is an outlying point in my map, and is exceedingly uncertain. We reached it after a long ride across the mountains from the Gebren valley: it was arranged that I should remain for the forenoon to copy inscriptions at the Roman Colony Olbasa, while Mr. A. H. Smith went on in front to survey the route. The road, however, is a difficult one in the first place to find, and in the second place to map with any accuracy. I lost my way, and it is uncertain whether Mr. Smith succeeded in finding the direct way. I overtook him at nightfall, and we arrived at Istanosz in a dark moonless night two hours after sunset. Next day we returned into the mountains, retracing the latter part of the previous day's road, and then I made an excursion through the mountains, camping out for a night, while Mr. Smith and the camp made a circuit, passing near Istanosz and along the valley of the Istanosz Su. As to the observations on which my map is founded, I may here say that this circuit by Istanosz and the southern villages of the valley is the only part of my map in which I depend on any observations except my own. Throughout the rest I found all results on my own observations, except

the position of four villages in different parts of the country, which I have added after drawing my map, they having been visited only by Mr. Smith.

The following results are deduced from this comparative table, and though of course I do not think that the authority of my necessarily rough and entirely untrained work is sufficient to decide the question, I give it for what it may be worth. (1) In the difference between Spratt and Kiepert's map, according to Benndorf-Niemann, Spratt is more nearly correct. (2) Where Hamilton's latitudes differ from Wrontchenko's, Hamilton's authority is higher. It must be observed that there is a misprint in one of Hamilton's latitudes. In his Table (ii. p. 394) he gives Khonas as $37^{\circ} 48'$, and Denizli as $37^{\circ} 45'$; but in his text (i. p. 513) he says that Denizli is by meridian observation one mile north of Khonas. The latter statement is approximately true (for according to the railway survey Denizli is about two miles north of Khonas), and the former statement is therefore a mere misprint. The correction is obvious: if we read $43' 48''$ instead of $48'$, we make Khonas about one mile south of Denizli by a change, which supposes a very natural and easy error of printer or scribe.* With this correction my latitudes agree admirably with Hamilton's, mine being in every case a few seconds further north than his, except in Khonas, where I am $28''$ further south.

With Wrontchenko I have one more point of comparison than with Hamilton, six instead of five. The differences between him and me range from $- 2' 22''$ to $+ 2' 6''$. In the case of greatest difference, Bulladan, where Wrontchenko is $2' 22''$ north of me, the evidence of Hamilton confirms me, for Hamilton gives the latitude of Tripolis, close to Bulladan, $25''$ south of me; now my readings from each place to the other show that Bulladan is very slightly south of Tripolis. Let us even suppose that there is here a mere clerical error in Wrontchenko's number, his differences from me still range between $- 2' 22''$ and $+ 37''$. Wrontchenko's latitudes therefore both vary more widely from mine than Hamilton's do, and also vary more irregularly, which is a much worse feature.

So far, therefore, as any deduction can be drawn from my map, the principle is probable that where any serious variation exists between the latitudes observed by Hamilton and by Wrontchenko, the latitudes of Hamilton are to be preferred.

I add here a comparative table of Hamilton's observations with those of Wrontchenko so far as they are known to me.

	Wrontchenko.	Hamilton.	Hamilton (2nd obs.)	Ainsworth.
	° ' "	° ' "	° ' "	° ' "
1. Angora	39 56 24	39 56 15	39 55 45	39 56 30
2. Sivri Hissar	39 27 54	39 27 30	..	
3. Koula	38 83 30	38 31 0	38 31 30	
4. Afion Kara Hissar	38 43 0	38 44 45	38 43 15	
5. Kaisari	38 43 0	38 41 50	38 42 7	38 41 40
6. Develi Kara Hissar	38 21 0	38 20 0	..	38 21 20
7. Nev Sheher	38 37 0	..	..	38 37 0
8. Ak Seral	38 21 30	38 20 15		
9. Konia	37 52 18	37 50 30		
10. Ak Sheher	38 22 54	38 17 30		
11. Kotch Hissar .. .. .	..	38 54 30	..	38 55 50

In this list 1, 2, 4, agree fairly well; the discrepancy in 3 is not important, as it may be judged by the surveys of the Smyrna and Cassaba railway extension. The

* The latitude of Tripolis proves that the error lies in the number for Khonas, not in that for Denizli.

extraordinary discrepancy in 10 can be explained only by some error in arithmetic or in transcription or printing.

The discrepancy in regard to Kaisari is especially important. Wrontchenko places it a minute further north than Hamilton; and on this question the map of the whole of eastern Asia Minor is to a certain degree dependent.* In this case Hamilton is confirmed by Ainsworth, but in other three cases Ainsworth agrees better with Wrontchenko.

GEOGRAPHICAL NOTES.

Explorations in Mashona Land by Mr. F. C. Selous.—We have just received from our correspondent Mr. Selous a brief account, with an excellent map, of a journey from which he returned (to the Transvaal) in January last, and in which (in company with Messrs. J. A. Jamieson, A. C. Fountaine, and F. Cooper), he explored a large extent of the Mashona country. We hope to publish this map and letter in the next number of the 'Proceedings.' During the journey a considerable tract of alluvial gold-fields was discovered, and a very remarkable excavation, in solid rock, which he believes to be a mine of very ancient date. Regarding this he says, "At Sinoia, near the river Angwa (a tributary of the Manyame) there is an immense circular hole about 100 feet or more in depth and 60 feet or more in diameter, at the bottom of which is a pool of water which extends some 180 feet into a vast cavern in the rock. The water is of a most wonderful colour—a deep cobalt blue—and very clear, as pebbles are visible at a great depth in the bottom. There is a slanting shaft or tunnel running at an angle of about 45 degrees from a point about 100 yards distant from the top of the hole, which strikes the bottom of the latter just at the edge of the water. We are inclined to think that all these excavations are the result of old gold-workings, and that a vein of quartz has been worked out down the tunnel and that eventually a spring was tapped, the water of which, welling up from below, has formed the subterranean lake. If the whole thing is the work of man a truly extraordinary amount of labour must have been expended in this place. The natives have built a stockaded town round the old gold-mine, or whatever it is, and go down the tunnel to draw water. We bathed in it and swam up the cavern to the other end of the pool; the water was quite warm. The rock on each side of the tunnel is covered with innumerable scorings which look as if they had been done with some kind of iron instrument.

The Voyage of the French Gunboat 'Niger' to Timbuku.—The French newspaper *Le Temps*,† of January 15th, contains an interesting account of a voyage made by the gunboat *Niger*, under the command of

* Prof. Kiepert informed me that he has taken Wrontchenko's observation of Kaisari as authority for his new (unpublished) map of Asia Minor.

† Communicated to the Society by the Foreign Office.

Lieutenant Caron, from Bammako, on the upper waters of the river *Niger*, to Korioume, the port of Timbuktu. The journey occupied three months, and will lead to an improved knowledge of the course of this part of the great African river. The expedition quitted Manambugu (30 miles below Bammako) on 1st July last, and twelve days later reached Diafarabe. Below this point the party entered the unknown country which forms part of the States of Tidiani, the chief of Macina. Later on they anchored at Mopti, whence Lieutenant Caron made an overland journey to the Tuculeur chief at Bandiagara. His reception was not very cordial, Tidiani and his advisers appearing to be afraid of the French influence with the Puls, Bambaras, and other subject peoples, who exhibited great friendliness to M. Caron. Bandiagara is a most important centre of the Mahomedan religion; the town resembles a huge convent. On 6th August the party started northwards down the stream by the same arm of the river as René Caillié followed in 1828. The banks were uninhabited, the natives having retired into the interior. It was not easy to get provisions and fuel (for the steamer). On the 9th the *Niger* debouched into Lake Dheboë, a magnificent sheet of water. Caillié does not mention the Koli-Koli which flows into the lake near Faranguela and waters the province of Formagha. Below the lake the *Niger* takes the name of Bara Issa. Its banks are lined with populous villages, especially the right shore. The gunboat cast anchor as a rule away from inhabited spots, in order to avoid hostilities. Tidiani had issued strict orders that the Puls and Bambaras were not to be allowed to have any communication with the French. On the 15th the party arrived at the point where the river forks; this is beyond the possessions of Tidiani. The waters are very low in the vicinity of Timbuktu, and did not allow of the gunboat proceeding to the town. Anarchy was reigning in Timbuktu. The *djemaa*, or association of merchants, had been expelled two years before, and Rhiaia, the present chief, supported by the Tuaregs, had been installed, but he in his turn was completely dependent on his turbulent neighbours, Liuarlish. The great chief of the Tuaregs, Alimsar, does not concern himself with the affairs of the town. The party, after Tidiani's reception, did not expect a warm welcome. Lieutenant Caron took every precaution to prevent any collision with the people. Knowing the perfidious character of the Tuaregs, the party slept on board every night, and no excursions were made into the interior. All negotiations with the chiefs failed. Under these circumstances the travellers deemed it advisable to return. After some perilous navigation, owing to the ignorance of the pilots, he reached Lake Dheboë on 3rd September. He decided to proceed up the Diaka, or western branch of the river, which had not been explored. Soon after entering the river from the lake a squall nearly wrecked the boat. The voyage to Dia was toilsome and monotonous; the banks afforded very little fuel. On 17th September the party was again at

Diafarabe, and three weeks later at Manambugu. A vast amount of ethnographical and other valuable information was obtained about this hitherto little-known region, and a detailed survey was executed of all this part of the Niger. The strictly pacific attitude adopted by M. Caron created most favourable impressions among the natives generally.

Algeria.—In his recently published Report (No. 249) for the year 1886, on the commerce and agriculture of Algeria, Sir Lambert Playfair, our Consul-General at Algiers, gives some statistical and other information interesting to geographers. The census of population taken in 1886 shows the following result:—

Nationalities.	1881.	1886.	Increase.
French	195,418	219,627	24,209
Jews	35,663	42,595	6,932
Tunisians .. .. .	..	4,895	4,895
Mahomedan French subjects ..	2,842,497	3,264,481	441,324
Moroccans .. .. .	..	17,445	..
Foreigners	181,354	203,153	..
	3,254,932	3,752,196	

As regards colonisation, the results are not satisfactory. During the year ending 30th September, 1887, five new villages were created. The domain lands lying in the vicinity of villages are put up for auction every year; but only 87,500 acres were sold between 1882 and 1887, and only 150 French inhabitants have settled on them. Meteorological stations were established in 1886 at the following places:—Ghardaia, Bizerta, Sfax, and Djerba, making the total number of stations in North Africa 41. Speaking of the forests of the country, Sir Lambert Playfair says, "The vicinity of the desert and the geological formation of the colony expose it to frequent drought. The rivers are few and rapid, and where rain-water is not retained by irrigational works or by forests, the ground absorbs only a small portion, and the bulk is carried to the sea, removing with it a considerable amount of alluvial soil. Barrages have been constructed, but these are liable to be carried away by heavy rains. These facts show, what indeed was never doubtful, the absolute necessity of planting trees, especially in the basins whence these dams are supplied. The Government has the power of preventing the destruction of trees and brushwood wherever it pleases. This greatly facilitates the Forest Department in re-wooding the country. The great difficulty lies in the habits of the Arab and Berber races, who, from time immemorial, have been in the habit of burning the dry grass to obtain succulent pasturage for their flocks and herds."

Further Ascents of Mt. Roraima.—Since Mr. Im Thurn's ascent of Roraima in 1884 ('Proceedings,' vol. vii. p. 497), that mountain has been ascended twice, on both occasions by English orchid collectors—

Mr. Cromer, in November 1886, and Mr. F. Dressel, on October 14, 1886. It will be remembered that Mr. Im Thurn's ascent took place at the beginning of the rainy season, when everything was supersaturated. Mr. Dressel's visit took place in the dry season, scarcely any rain falling, and that of a light character and of short duration. He found the upper surface comparatively dry, the elevated portions most markedly so; while large areas of the sward-like levels were perfectly desiccated. The water in the various channels was very shallow, and the deep basins or depressions contained but very small quantities, though in no case were any found to be quite dry. Frequently the surface of the water in these shallow basins was more or less covered with a green, apparently a confervoid layer. In the pools at the bottom of these wide basins Mr. Dressel found a considerable quantity of quartz, in the form both of separate crystals and of aggregate masses, of various and often of large sizes. It will be remembered that in the first ascent no animal life was noticed during the short time that Mr. Im Thurn spent on the top. Though Mr. Dressel saw no birds during his two or three hours' stay, he observed a few butterflies, all of a dark-brown and nearly black colour. In the shallow basins a few specimens of a small black toad with a yellow spot on the throat were seen. A third animal form was found in the moist earth attached to some plants which had been pulled up; a millipede, according to *Timekhri*, allied to the *Julus*. The fantastic shapes into which the sandstones have been formed, and the calmness of the scene, which have been so graphically described by Mr. Im Thurn, affected Mr. Dressel in a similar manner. He mentions that the surface of the rock presents very closely the appearance of granite, owing to the weathering, and at first he thought some mistake had been made in describing the formation as sandstone, until he moved away a small rock from its setting, when its real nature was revealed. Although Mr. Dressel found the descent of the mountain attended with some difficulty, he regards both the ascent and descent of Roraima as very much easier than is the case with the Merumé Mountains, over which he had to climb to and from the Mazaruni.

Paraguay.—Last November, Captain Sándalo Sosa and Dr. De Bourgade returned to Asuncion from a journey through Paraguay from the river Jejui to the Guaira Falls. The natives were found to be well disposed. They cultivate maize, tobacco, beans, and cotton, from which they weave ponchos and other articles of clothing. The travellers came across a hitherto unknown tribe, called by the other Indians Apytère, or "dwellers in the centre," living further down stream than the Cainguas and the Guaranis. The geographical results of the expedition are given as follows:—The exploration of the Jejui, the banks of the Igatimi and of the Upper Parana from the mouth of the Igatimi to the Guaira Falls; survey of the junction between the Piquiry and Parana; the discovery and exploration of two important affluents of the Igatimi,

viz. the Ipytá and Thoby, and the study of the natural products and geology of a considerable stretch of Paraguayan and Brazilian territory. With regard to the Guaira Falls, the travellers state that their grandeur has been exaggerated by former explorers.

The Chilian Andes.—An exploration of an important character is contemplated by an expedition which started from Mendoza on 1st December last. The leaders are Dr. F. Kurtz, Professor of Botany at the University of Cordoba, and Dr. W. Bodenbender, Curator of the Palæontological Museum at the same university. It is intended to explore the eastern slopes of the Cordillera from Mendoza to the Rio Negro. From various points excursions will be made further westwards into the mountains. Dr. Kurtz has charge of the topographical, climatological, and geological part of the work, while his colleague will confine his attention to botany and zoology. The cost of the expedition, which is admirably equipped, is being borne principally by the Geographical Institute of Buenos Ayres.

The Population of Colombia.—According to the Report (No. 253) of Mr. W. J. Dickson, British Consul at Bogota, the population of the various States of Colombia is as follows:—Boyacá, 483,874; Cauca, 435,690; Santander, 423,427; Cundinamarca, 409,602; Antioquia, 365,974; Bolivar, 300,000; Tolima, 230,821; Panama, 220,600; Magdalena, 85,255; making a total of 2,955,243. These figures are based on a return quite recently published by the Colombian Government.

A new American Geographical Society.—Under the title of the National Geographical Society a new society has been incorporated in the United States for one hundred years, as we learn from *Science*. Its principal objects are stated to be—to increase and diffuse geographical knowledge, to publish the transactions of the society, a periodical magazine and other works relating to the science of geography, and to acquire a library under the restrictions and regulations to be established by its bye-laws. The president of the society is Professor Gardiner G. Hubbard, and among the other officers are Mr. H. G. Ogden, of the U.S. Coast Survey, Commander J. R. Bartlett, of the Hydrographic Office, General Greely, Chief Signal Officer, Mr. Henry Gannett, of the U.S. Geological Survey, and Mr. Cleveland Abbé, of the U.S. Signal Office, while other members named in the Charter are Captain C. E. Dutton and Mr. J. W. Powell.

REPORT OF THE EVENING MEETINGS, SESSION 1887-8.

Fifth Meeting, 30th January, 1888.—Sir RUTHERFORD ALCOCK, K.C.B.,
Vice-President, in the Chair.

ELECTIONS.—*W. B. Anthony, Esq.; Frederick Hugh Barber, Esq.; Graham H. Barber, Esq.; Harry Miford Barber, Esq.; John Johnson Dunn, Esq.; Lieut. Charles Gerald Shepherd Eeles, R.N.; Rev. W. B. K. Francis, B.A.; Captain Charles James Gray; Robert James Gray, Esq.; John Hamilton, Esq.; George H. Holden, Esq., C.E.; Captain Edwin Jackson; Hles Mathews, Esq.; Arthur J. Montefiore, Esq.; Thomas Burnett Ramsay, Esq.; James More Reid, Esq., M.D.; James Meadows Rendel, Esq.; Harry Smith-Turberville, Esq.; Rev. Charles John Stower; Edward A. Tonna, Esq.; John Henry Wearing, Esq.; Stephen White, Esq.*

The papers read were :—

1. "Exploration and Survey of the Little Andamans." By Maurice Portman, Esq. Will be published, with map, in a subsequent number of the 'Proceedings.'
2. "Summary of Explorations in British North Borneo." By Admiral R. C. Mayne, C.B., M.P. (*ante*, p. 134.)

Sixth Meeting, 13th February, 1888.—General R. STRACHEY, R.E., F.R.S.,
President, in the Chair.

ELECTIONS.—*Thos. Allnutt Brassey, Esq.; Michael Jonas Frederic Hiddings, Esq.; George Martin, Esq.; James Oddie, Esq., J.P.; Henry Keylock Rusden, Esq.; Capt. William Waring; James John Cooper Wyld, Esq.*

The paper read was :—

- "A Journey in the Interior of Labrador." By Randle F. Holme, Esq. Will be published in the April number of the 'Proceedings.'
-

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris, January 6th, 1888: M. JANNSEN, of the Institute, in the Chair.—The Geographical Society of Ain forwarded a circular relative to the next National Geographical Congress (10th Session), which is to be held this year at Bourg. Among the questions to be discussed are (1) French colonisation; (2) the best means by which the French Geographical Societies may extend their influence and work. There will be an excursion into the Jura Mountains across the picturesque ravines of the Bugey.—M. F. de Lesseps stated that at the end of March he intended going out to the Isthmus of Panama in order to inaugurate the works of M. Eiffel, who now has charge of the operations. In consequence of various unforeseen circumstances, he feared that the limit of time which had been assigned for the opening of the canal would have to be extended. The delay was partly caused by some hard rock which had been encountered about the middle of the isthmus. Six years would be required for the entire completion of the work. Provisional means of communication between the two oceans would, however, be established before long by means of two basins which were to be excavated near Culebra, and would be fed by the waters of the Chagres river, conveyed through iron sluices.—M. Jules Girard, the Assistant Secretary, laid on the table a work, of which he is the author, on the subject of the distribution of temperature on the

surface of the globe. M. Girard's study shows that the theory of the distribution of heat does not agree with the corresponding temperature at the degrees of latitude.—Among the other presentations, which were numerous, were the first volume of a work on the Congo region, by M. A. Merloy, Catholic missionary on the Upper Congo; and a map of the Amazons by M. J. Vellozo Bareto, the most indefatigable geographer of Brazil. The latter was forwarded by M. Lavenère, member of the Archæological and Geographical Institute of Alagoa.—M. Venukoff communicated some information as to Russian geographers. M. Prejevalsky's book on his fourth journey in Central Asia would be published in the month of May. The numerical results of the astronomical and hypsometrical observations of M. Prejevalsky had already been published in the Bulletin of the Geographical Society of Russia (1887). General Stebnitzky was continuing his critical studies on the gravity and distribution of masses in the interior of the earth. He shows that the law of the increase of density in the ellipsoidal strata of the earth as its centre is approached, although not yet established, is on the way to being proved. General Tillo, to whom the Topographical Society of France had recently awarded a gold medal for his geodetical works, had just published an important memoir on the distribution of temperature and atmospheric pressure on the earth's surface.* M. Woëlkoff, professor of geography at the University of St. Petersburg, had published his interesting researches on the dryness of the atmospheric air which had been observed in Russia in the year 1885. He was also the author of a memoir on the freezing and breaking up of the ice in Russian rivers, based on a large number of observations. Finally, M. Venukoff announced that in the northern part of Saghalien abundant springs of naphtha had been discovered; indeed, it was reported that whole lakes of it had been found.—A note was transmitted by M. Dutreuil de Rhins, with reference to General Walker's hypothesis on the subject of the Irawadi. M. de Rhins states that General Walker cannot support his theory from the information gathered by Abbé Desgodins when he was in Tibet, according to which it would appear that the Lu-kiang is the upper course of the Salwin, and not of the Irawadi. This view is in accord with that of Chinese geographers. As regards the opinion of M. Loczy, the geologist of the Szechenyi expedition, quoted by General Walker in support of his theory, which is that the Salwin is of too little importance to have its source in the heart of Tibet, M. du Rhins says that he has disregarded this opinion, because M. Loczy did not get within nearly 200 miles of the region in question, and also because at 25° lat., on the route from Tali to Bhamo, studied by several travellers, the Salwin flows with a very strong current in a bed 100 yards wide, while the bed of the Mekong, which undoubtedly traverses Tibet, has only a breadth of 90 yards.—Captain Quiguandon sent a memoir on the mission which he, in company with Dr. Tautain, had fulfilled in Beledugu and in the country to the north of the same. This paper is to be inserted in the quarterly Bulletin of the Society.—A letter was read from Dr. Colin announcing his departure at the end of November on his journey along the Upper Senegal, in the course of which he intends to execute a topographical survey of the region between the Faleme and the Bafing, and to trace these two rivers to their sources. He had concluded a treaty with Famale, chief of Diebedugu, by which the whole of that country would be placed under French protectorate.—M. Romanet du Caillaud made a brief communication on the explorations carried out by the missionaries of the "Sacré-Cœur" in New Guinea. These consisted of a series of very short excursions along several small rivers debouching into Hall Sound, and of a several days' voyage up a previously unknown and large river, which they named the St. Joseph.—The Chairman announced that an extra-

* See 'R. G. S. Proceedings,' 1887, p. 763.

ordinary meeting would be held in the large Sorbonne Hall on the 14th of the month, to receive MM. Capus, Bonvalot, and Pepin. M. F. de Lesseps would take the Chair.—In conclusion, M. A. Dumont gave an account of his project for a railway from the coast of Syria to the Persian Gulf along the valley of the Euphrates. Such a railway, he said, offered little difficulty, and was a necessary complement of the Suez Canal.

—January 14th, 1888 : M. Ferdinand de Lesseps, President of the Society, in the Chair.—This was a special meeting held in the large Sorbonne Hall, and convened for the purpose of receiving MM. Bonvalot, Capus, and Pepin, on their return from Central Asia. Among those present on the platform were M. X. Charmes, representing the Minister of Public Instruction, MM. Himly, Bouquet de la Grye, Levasseur and Grandidier, of the Institute, Duveyrier, Chaffanjon, Rabot and Doula, travellers, Prince Roland Bonaparte, Baron Frederickz, military attaché to the Russian Embassy of Paris. The Chairman in a few opening remarks welcomed the three travellers back from their hazardous journey. Across the valleys of Persia, the burning sands of Karakorum, Bokhara, and Ferganah, they had, he said, reached the ice-clad mountains of the Pamir, which they had traversed in the depth of winter. From this great journey, so daring in its latter stages, they had brought back an inestimable wealth of new information regarding countries, the geography of which was as important as their history. M. Bonvalot then gave an account of his travels in company with MM. Capus and Pepin, in Central Asia, and across the Pamir Plateau. The following is a brief résumé of this important communication which will be inserted *in extenso* in the quarterly Bulletin. The expedition, the cost of which was defrayed by the Minister of Public Instruction, started in February 1886, and quickly reached Merv, where the travellers had the good fortune to be present at the inauguration of the line of railway. Thence they proceeded to Samarcand, and from this point made an unsuccessful attempt to penetrate into the heart of Afghanistan, being stopped on the banks of the Amu-Daria. After twenty-six days of captivity they returned to Samarcand, and prepared for a journey across the great plateau of Pamir, with the view of reaching British India. Although by travelling in the winter they ran great risks from the enormous quantity of snow, the rarefaction of the air and the excessive cold, they were nevertheless certain of avoiding the nomad banditti who infest this region during the warmer months. Having to journey across a desert with a polar temperature, and often at an altitude greater than the summit of Mont Blanc, where victuals, fuel, forage, and shelter were not to be met with, the party had to take an enormous quantity of baggage. On 6th March the travellers set out for Ak-Basoga, whence they proceeded to the Taldik Pass. Here Captain Gluchanofski, second in command of the district of Osh, assembled about 200 men, who after working for three days managed to cut out a way for the party through the snow which obstructed the pass. At this time the travellers had twenty-four saddle-horses and thirty pack-horses. It was necessary to journey by the light of the moon, in order to avoid the threatening avalanches. From here to the great Kizil-Art Pass they had to undergo the severest hardships. The 18th and 19th March were two terrible days. All the members of the expedition suffered from cracked lips and sore eyes. The rate of advance was sometimes twenty, and at times only ten yards a minute. The men were without breath and strength, and were almost totally blind. The horses suffered similarly, and many died. On 20th March the Pamir was reached. Here the cold was intense; the mercury froze on the 31st. A few days later some Chinese were encountered, who attempted to oppose the onward march of the party. They were made prisoners in order to prevent them from giving the alarm. During the night of 9th April, the only remaining guide took flight with the best horse. At Chitral their further progress was stopped by the Afghans, and for forty-nine days they were kept

prisoners. While MM. Capus and Pepin went to Chitral to explain matters to the Khan, M. Bonvalot contrived to send a note to British India, and the travellers were rescued on the 6th July from their critical position by the interference of the British Government. M. Bonvalot's paper was warmly applauded throughout, and in conclusion the Chairman expressed the hope that the Government might be induced to recognise the valuable scientific results of the expedition by making a grant to the travellers.

—— January 20th, 1888: Dr. HAMY in the Chair.—Among the works laid on the table was one presented by Dr. Hyades, entitled, 'Mission du Cap Horn: Histoire du Voyage,' by Commandant Martial. The Chairman recalled the fact that the late M. Martial was the head of the Cape Horn Expedition.—M. Venukoff communicated some information on the progress of geography in Russia. He commented on General Stebnitzky's recent memoir pointing out the necessity of making observations on local attraction, because of their influence on the numerical results of astronomical and geodetical works. The author gives the following instance:—Taking as a basis the astronomical observations made at Vyborg, and calculating therefrom the geographical position of Pulkowa, which is connected with Vyborg by a trigonometrical system, the following astonishing result is obtained, viz. that the central astronomical observatory of Russia is displaced from the position assigned to it on the topographical maps to the extent of 200 yards, whereas the whole distance between Vyborg and Pulkowa is only 122 miles. Considering that the latitude and longitude of Vyborg are so accurately determined, and the triangulation connecting it with Pulkowa so exact, the only conclusion to be drawn is, that there is at Vyborg, or in the vicinity of St. Petersburg, some local attraction which causes the pendulum to deviate from the vertical. Similar studies to those of General Stebnitzky have already been commenced by M. Veltkitzky in Nova Zembla, also in France by Captain Desforges. M. Venukoff further states that Professor Voieikoff is engaged in studies on the climate of Central Asia, taking as a basis the recent observations of MM. Prejevalsky and Potanin. M. Katanoff, an orientalist, has been despatched to Mongolia and the north of China to make ethnographical researches on the scattered peoples of the Turkish race in those regions. A Russian, resident at Séul, M. Chumsky, is publishing a series of letters on the present state of Korea. Its economical and social prospects are very gloomy; the Koreans are being ruined by the aristocracy of the country.—M. Desgodins forwarded a new series of meteorological observations made in India by his brother, Abbé Desgodins, during last summer.—A letter, dated 15th December, 1887, from Kayes, was read from Colonel Gallieni, Commander-in-chief of French Sudan, giving an account of the voyage made by the *Niger* to Korioumé, the port of Timbuctu.—M. J. C. Reichenbach wrote from Assini (Gold Coast) that he had made some short excursions into the surrounding country, and would communicate his notes to the Society. He was of opinion that an exploration up to Kong by the natural routes, either along the Akba or the Bia, would be valuable both from a geographical and commercial point of view.—M. G. Demanche presented the report of the *Alert* Expedition in 1886 in Hudson's Bay, under the command of Lieut. A. Gordon, and made some observations himself on the work of the expedition.—The report on the state of the Library and Collections of the Society for 1887 was presented by M. James Jackson, the Society's Librarian. From this document it appears that there was during the year an addition of 1092 works, comprising 1244 volumes, 96 maps in 172 sheets, 16 atlases, and 2116 photographs. The album of portraits of travellers now contained 2060 portraits. The collection of photographic views consisted of 584 series, comprising 8440 photographs. The number of visitors was 534 against 394 in the year 1886. From the general

resemblance of the figures of 1887 to those of the year 1886, it may perhaps be taken that the Library has reached its normal position.—In conclusion, a communication was read by M. Henri Binder on his travels in Kurdistan. The name Kurdistan, he said, was given by the Turks to a collection of villages, to which the name Armenia would better apply. The real country inhabited by the Kurds was the mountainous district separating Persia from Turkey (in Asia), extending from north-west to south-east, between 34° and 40° N. lat. and 38° and 46° E. long. He then described the general appearance of the country and its orographical system. Lakes Urmiah and Van were situated in the centre of the immense tablelands, in which the flanks of the mountains extend towards the east and west. The former lake, on account of its small depth and the extreme density of its waters, which are six times more saline than sea-water, does not seem to have a great future before it; the latter lake, however, offers many advantages, provided the Turks show more regard for the enterprises which Europeans are attempting to establish on its shores. M. Binder then traced the history of the Kurds, and referred to the still current tradition that they have French blood in their veins. The variety of the religions in the country is the fundamental cause of infinite variety among the tribes. He also dwelt on the occupations and modes of life of the nomadic and the sedentary Kurds, between whom there is a very sharp distinction. He terminated his remarks by giving some very curious details regarding the sect of the Subbas, which has a tendency to disappear. The religion of this sect, with its strange and often grotesque rites, is a mixture of Gnostic and Christian ideas.

Geographical Society of Berlin, February 4th, 1888: Baron von RICHTHOFEN in the Chair.—Professor Möbius, Director of the Zoological Museum at Berlin, spoke upon the zoological and physical conditions of the Baltic Sea, to the exploration of which he, as a member of the Prussian Commission which has existed since 1871 for the scientific study of German waters, has contributed so much. The first systematic investigation of the fauna of the western part of the Baltic was carried out by the speaker in company with H. A. Meyer in 1860 and the following years in the inlet of Kiel. This has, like all the fjords situated on the east coast of Schleswig-Holstein and Jutland, sandy shores partly covered with rocks, bordering on which is the shallow sea-weed region. The bottom of the valley, covered with black mud 40 to 60 feet deep, has a steep slope, and this mud is carried down to the sea, forming at the mouth of the river banks on which are found floridæ or red-brown algæ. In no part of the western half of the Baltic is the depth of the water greater than 11 fathoms; between Sweden and Rügen the depth increases to 27 fathoms, while east of Bornholm and north of Danzig to 54 fathoms. The deepest point of the Baltic lies north of Gottland, and is about 175 fathoms. In the shallow water sea-weed grows, in the deeper parts fields of floridæ are formed, while in the greatest depths the bottom consists of mud or clay. The numerous rocks lying on the mud-banks are covered with plants and conceal a rich animal life which attracts in its turn many fishes; but the latter cannot unfortunately be caught in the large ground-nets used in the North Sea, because the nets are torn by the stones. The question of the depth of the straits connecting the Baltic with the North Sea is of the highest importance in connection with the quantity of salt in the Baltic, and on that account with the animal life of the same. The smallest depth of the Great Belt is from 13 to 21 fathoms, that of the Little Belt from 9 to 11 fathoms, that of the Sound from 4 to 7 fathoms. Through the Sound most of the pure fresh water of the Baltic flows out into the North Sea, and also through the two Belts, but only in the upper current; the ground current

brings the salt water of the North Sea into the Baltic. On the 17th June, 1871, samples of water from the Great Belt showed the following results:—

					Quantity of Salt.	Direction of Current.		
At the surface	..	..	..	..	1·0 per cent.	..	..	N.
At 5 fathoms	..	..	..	..	1·017	..	..	N.
At 15	..	..	..	..	2·8	..	..	S.
At 20	..	..	..	..	3·006	..	..	S.
At 35	..	..	..	..	3·026	..	..	S.

In the Sound at Helsingör on the 27th June, 1871, the water showed at the surface ·026 per cent. of salt, and at the bottom, at a depth of 18 fathoms, 3·35 per cent. The average quantity of salt in Kiel Bay is as follows:—At the surface, 1·7 per cent.; at 6 fathoms, 1·9 per cent.; at 10 fathoms, 2·1 per cent. In the western part of the Baltic an average of 2 per cent.; in the eastern part, 1 to 1·5 per cent. at the bottom, and 0·6 to 0·8 per cent. at the surface. The marine animals which continually live in the Baltic are not brackish-water animals, as has been assumed, but sea-animals which can live in sea-water containing a large or small amount of salt. They are, however, able to bear great fluctuations of temperature; for instance, in the Bay of Kiel the water temperature ranges from 32° (Fahr.) to 72°. The change of temperature and the quantity of salt have a preventive effect on their growth; they are on that account mostly smaller than those of their species in the North Sea and Polar Sea. In the greater and colder depths of the eastern Baltic there are some Arctic fish, which point to a former connection between the Baltic and the Arctic Ocean. At the present time there are 109 known varieties of fish in the Baltic, and 380 species of marine invertebrated animals.—Dr. Wiedemann then made some remarks based on his own personal observation, on the Trans-Caspian Railway and its economic importance. The Trans-Caspian Railway has lost its exclusive character as a military railroad, since it was determined that it should be extended in April next to Samarkand. Besides its strategical importance it possesses an eminently economic value, inasmuch as it will contribute very considerably to the consolidation and extension of Russia's commerce with Central Asia. Begun in the year 1880, the line, after it had in 1881 reached Kizil-Arvat in the Akhal Oasis, remained stationary until the spring of 1885, when the Afghan question entered upon a critical stage. In November 1885 the section as far as Askabad was completed, and in July 1886, the line was finished up to Merv. Thus in fourteen months 350 miles were constructed. While the construction of the line was being continued further to the Amu-daria, the necessary supplementary works in the rear were carried out. In the place of small wooden houses and mud-huts which did duty for stations, massive station premises were built of stone, with gardens and canals attached. The wood required for the construction of the bridge over the Amu-daria was brought down the Volga, and thence by boat to Usun-ada, and by rail to its destination. At the end of December 1887, the principal bridge, $1\frac{3}{8}$ mile in length, was completed. At the same time at four different points the construction of the line to Samarkand had been begun, and the bridge having been finished, the rails and beams for the Charjui-Bokhara-Samarkand section could be conveyed across it. The total length of the line is 895 miles. The old Orenberg-Kasalinsk caravan route will soon be deserted as soon as the administration of the railway introduces a regular system of differential tariffs in place of the former uniform charges, especially as the transport along the caravan route occupies from a month to six weeks, and in winter from four to five months. The established industrial population of Ferghana, Zerafshan, Tashkend, and Khodjend, offer already a safe market for Russian textile, leather, and metal industries. The chief

centre of this trade is Tashkend. The export articles are raw silk, cotton, corn, tobacco, rice, dried fruits, and especially sheep-skins and sheep-guts. Cotton is destined to play the most important part among these articles, since the cultivation of American cotton has been commenced with the greatest success in the neighbourhood of Tashkend and Samarkand; in the former place in 1887 three full crops were produced from one field. The total area of cotton plantations in Turkistan is estimated at 600 *desiatines* or about 1500 acres, and will soon render Russia independent of foreign countries as regards cotton. The valuable market of Bokhara, with its 2,100,000 inhabitants, is now being commanded almost exclusively by Russia; the South Russian sugar-producers and the weavers of Russian Poland already have their agents in these regions. Side by side with this there is a steady repression of foreign—which means English—imported articles going on. While the goods imported *viâ* Herat in 1881 amounted to 64,000 poods (1025 tons), the same diminished in 1884 to 30,600 poods (490 tons.) In Trans-Caspia the railway is acting as a great civilising agent. In Askabad new bazaars are being erected; a steam-mill grinds the flour for the troops stationed there. The predatory excursions of the savage inhabitants are being rapidly suppressed and the people are even now adopting a settled life; order and security are being established, and in consequence there is a period of progress and increase of population in store for these thinly peopled territories. Standing in close connection with this altered state of affairs are two measures adopted by the Russian Government, viz. the closing of the free port of Batum whereby the importation of foreign articles of commerce is stopped, and the establishment of a fair and depôt at Baku, which is intended to be the Nishni Novgorod of Turkistan. Within recent years a fair has been regularly held there, which, with the development of the trade of Central Asia by means of the greatly facilitated means of communication, promises to become of great importance.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

Black, C. B.—Itinerary through Corsica by its Rail, Carriage, and Forest Roads. Illustrated by five maps and one plan. Edinburgh, A. and C. Black, 1888: 12mo., pp. vii. and 44. Price 1s. [Presented by the Author.]

Tuma, Anton.—Griechenland, Makedonien und Süd-Albanien, oder: Die Südliche Balkan-Halbinsel. Hannover, 1888: 8vo., pp. viii. and 329. Price 7s. (*Dulau.*)

While this work is mainly written from a military standpoint, and with special reference to the political division of the Southern Balkan Peninsula, the author has brought together into a connected form, from a variety of trustworthy sources, a useful general view of the physical geography of the region dealt with.

ASIA.

Ankel, Otto.—Grundzüge der Landesnatur des Westjordanlandes. Entwurf einer Monographie des Westjordanländischen Palästina. Frankfurt a. M., 1887: 8vo., pp. [8] and 129. Price 3s. 6d.

Dr. Ankel has brought together in this monograph a summary of all we know of the geology and physical geography of Palestine west of the Jordan, based on the latest and best authorities, including the researches of the Palestine Exploration Fund.

Büchner, E.—Zur Geschichte der Kaukasischen Ture (*Capra caucasica* Güld. und *Capra cylindricornis* Blyth). [Mémoires de l'Académie Impériale des Sciences de St.-Pétersbourg, vii^e série, tome xxxv., No. 8.] St.-Pétersbourg, 1887: 4to., pp. 27, plates.

Ferguson, John.—Ceylon in the "Jubilee Year." With an Account of the Progress made since 1803, and of the Present Condition of its Agricultural and Commercial Enterprises; the Resources awaiting development by Capitalists, and the unequalled attractions offered to Visitors. With much useful Statistical Information, specially prepared maps, and numerous illustrations. 3rd edition. London, John Haddon & Co.; Colombo, A. M. and J. Ferguson, 1887: 8vo., pp. xiv. and 427. Price 7s. 6d.

The present edition of this work has been revised, enlarged, and brought down to date. Large additions have been made to many of the chapters, more especially to those on Social and Legislative Progress, on Agricultural and Planting Industries, and on the future Government of Ceylon. A new chapter has been introduced dealing with the life, customs, caste, and occupations of the natives. To the Appendix additions have also been made, more especially with reference to missions, caste, the tea industry, statistical information, and the re-publication of recent letters of Mr. A. M. Ferguson, describing the pearl fisheries and ancient ruins of Ceylon. A full index has been added to the present edition.

Groot, Corns. [De].—Herinneringen aan Blitong, Historisch, Lithologisch, Mineralogisch, Geographisch, Geologisch, en Mijnbouwkundig. 's Gravenhage, Smets, 1887: 8vo., pp. xv. and 549. [Presented by the Right Hon. the Marquis of Salisbury.]

About 100 pages of this valuable work are devoted to the history of the island of Biliton. An equal space is occupied with the mineralogy of the island, with special reference to their economical uses. The geography and people are treated in full detail in 160 pages, the remainder of the work being devoted to the geology of the island.

India.—Synopsis of the results of the operations of the Great Trigonometrical Survey of India. Vol. VIIA. Descriptions and Co-ordinates of the Principal and Secondary Stations and other Fixed Points of the Jodhpore Meridional Series and the Eastern Sind Meridional Series of the North-west Quadrilateral. Prepared in the office of the Trigonometrical Branch, Survey of India, Col. C. T. Haig, R.E., Deputy Surveyor-General, in charge. Published under the orders of Col. H. R. Thuillier, R.E., Surveyor-General of India. Dehra Dun, Office of the Trigonometrical Branch, Survey of India, 1887: 4to., pp. x., xx., and 113, diagram and charts.

Portman, M. V.—A Manual of the Andamanese Languages. London, W. H. Allen & Co., 1887: 12mo., pp. vi. and 229. [Presented by the Author.]

Uslar, Baron P. K.—Etnographiya Kavkaza. Yazykoznanie. Abkhazskii yazyk. The Ethnography of the Caucasus. Philology. The Abkhasian Language. Tiflis, 1887, pp. xv., 193, and 102, with portrait of the author.

The late Baron Uslar's philological studies, embracing nearly a lifetime devoted to the languages of the Caucasus, have appeared in the Memoirs of the Imperial Academy of Sciences. The present volume, edited by M. R. Zavadsky, inspector of schools in the province of Caucasia, deals with the language of the Abkhasians, a people inhabiting the country lying between the spurs of the main range of the Caucasus and the Black Sea, and for the most part comprised in the Kuban. They number at the present day only some 34,000 of both sexes, having diminished to about one-third of their numbers since the late Russo-Turkish war. Known under various names, they speak one language with a few unimportant variations. The present volume, printed from Uslar's MSS., is divided into two parts, the first being exclusively devoted to the

Abkhasian language, its alphabet, grammar, and inflexions, with vocabularies, and collections of fables and proverbs. The second contains articles of more general philological interest, with special chapters on the languages of the Cherkesses, Ubykhs, and Suanetians.

AFRICA.

Arnot, F. S.—Among the Garenganze in Central Africa; being the Diary and Letters of Fred. Stanley Arnot from March to September 1886. London, J. E. Hawkins: 12mo., pp. 22, map and illustration. Price 1*d*.

— Six Months more among the Garenganze. Letters from September 1886 to March 1887. London, J. E. Hawkins: 12mo., pp. 24, maps and illustrations. Price 1*d*.

Barret, [Dr.] Paul.—L'Afrique Occidentale. La Nature et l'Homme Noir. Paris, Challamel et Cie., 1888: 2 vols. 8vo.; i., pp. xiii. and 402; ii., pp. 438. Price 15*s*.

Dr. Barret, besides having made several visits to the West Coast of Africa, sojourned for two years in the Gaboon region. He is a naval surgeon, and much of his book deals with the sanitary condition of the various regions. He, moreover, looks upon Africa and the Africans with the eye of a man of science, so that his volumes bear some original value. The first part of the first volume treats generally of Senegambia and Guinea; the second part, and the whole of volume second, being a systematic account of the Gaboon region in all its aspects. The subjects of the fauna and flora are treated in the greatest detail, while a very large amount of space is given to the natives.

[Murray's Handbooks.]—A Handbook for Travellers in Lower and Upper Egypt; including descriptions of the course of the Nile through Egypt and Nubia, Alexandria, Cairo, the Pyramids, Thebes, the Suez Canal, the Peninsula of Mount Sinai, the Oases, the Fayoom, &c. In two parts. Seventh edition. Thirty-three maps, plans, &c. London, John Murray, 1888: post 8vo., pp. xvi. and 562. Price 15*s*.

Schmidt, Karl Wilhelm.—Sansibar. Ein ostafrikanisches Culturbild. Leipzig, Brockhaus, 1888: 8vo., pp. xii. and 184. Price 5*s*. 6*d*. (*Dulau*.)

This is a valuable supplement to Burton's well-known book on Zanzibar, referring to a condition of things which existed more than twenty years ago. During that time many changes have taken place at Zanzibar, and Dr. Schmidt's book affords a very full and instructive account of existing conditions. He describes the town and its houses, outside and in; the various elements of the non-European population; the Sultan and his Government; the European population; trade; meteorological and sanitary conditions. There are several good illustrations and a plan of the town.

Soyaux, Hermann.—Deutsche Arbeit in Afrika. Leipzig, Brockhaus, 1888: 8vo., pp. vi. and 182. Price 4*s*. 6*d*.

This may be taken as a sort of guide to Germans intending to take part in German colonising enterprise in Africa. Herr Soyaux treats of our knowledge of German Africa in its various aspects; what we know of the climate of the various German colonies; formation of plantations; what are the various cultures suitable for plantations; the training of African natives; products of the present and future; the colonial education of Germans.

[The Sudan.]—Der Sudan unter Ägyptischer Herrschaft. Rückblicke auf die letzten sechzig Jahre. Nebst einem Anhang: Briefe Dr. Emin Pascha's und Lupton Bey's an Dr. Wilhelm Junker, 1883-85. Bearbeitet und herausgegeben von Richard Buchta. Leipzig, Brockhaus, 1888: 8vo., pp. viii. and 228. Price 6*s*. [Presented by Herr Richard Buchta.]

The first half of this volume is devoted to a history of what is known as the Egyptian Sudan under eight periods: (1) the early history; (2) Ismail Pasha's

government; (3) Gordon's first governor-generalship; (4) Gessi's campaign against Soliman Zebehr; (5) the Mahdi; (6) Hicks Pasha's campaign against Kordofan; (7) Osman Digma; (8) Gordon Pasha and his mission. The second part of the volume is of most interest. It contains extracts from the letters of Emin Pasha and Lupton Bey to Dr. Junker, and gives a very vivid picture of what was going on in the Equatorial Province and neighbouring regions during the troubles further north. Emin Pasha's brave struggle against the Mahdi's forces is made evident; the unfortunate surrender of Lupton; the departure of Dr. Junker, and Emin's solitary and critical position in Wadelai. There are two maps: one of Egypt and the Sudan, and the other of the Bahr-el-Ghazal and the Equatorial Province.

AMERICA.

Guillaume, H.—The Amazon Provinces of Peru as a Field for European Emigration. A Statistical and Geographical Review of the Country and its Resources, including the Gold and Silver Mines, together with a mass of Useful and Valuable Information, with map and illustrations. London, Wyman & Sons, 1888: 8vo., pp. xv. and 309. Price 3s. 6d. [Presented by the Author.]

The object of this work, we are told in the preface, "is to set forth in an unbiased account the interior of the country, and the resources of its vast uncultivated regions, without ignoring the difficulties and obstacles which have to be overcome." The author, as Consul-General for Peru, very naturally speaks of the country in its most favourable aspects. The volume, however, abounds with useful matter relating to Peru, including—its Extent, Boundaries, General Description, Climate, and History; General Description of the Amazon Provinces, or Montaña; products of the Montaña; the Rivers, Indian Tribes, and Vocabularies; Reports of Scientific Travellers; Railroads; the Sierra, or Mountain Districts; the Gold and Silver Mines of Cerro de Pasco and Yauli; the Minerals of the Ancachs Department; the Gold Mines of Peru; Political Organisation, Departments, Education; Emigration; Trade between England and Peru; Commercial Statistics. The Appendix consists of a translation of an article by Señor A. Raimondi, on the Gold Mines of Peru.

Moxly, [Rev.] J. H. Sutton.—An account of a West Indian Sanatorium, and a Guide to Barbados. London, Sampson Low & Co., 1886: 8vo., pp. xii. and 209. Price 3s. 6d.

One of the principal objects of this little work is to give the reader a right conception of the real nature of the climate of Barbados; to show the great salubrity of the island, and the beneficial effects on invalids of a brief visit to the place. On this subject the author gives the benefit of his own experience during his residence here of over nine years. He also gives a description of the scenery and natural characteristics of the island; the people, their social condition, &c., &c. Some useful matter will be found in the Appendix, among other things, a list of prices of the various articles of consumption, &c.; table of the rates of postage, either by packet or private ship; rates of passage by the various steamship lines to Barbados, &c., &c.

[North-west America.]—Captain Jacobsen's Reise an der Nordwestküste Amerikas 1881-3 . . . für den deutschen Leserkreis bearbeitet von A. Waldt. Leipzig, Spohrer. Price 4s. (*Dulau*.)

Captain Jacobsen, at the request of a special committee in Berlin, undertook a journey to the north-west coast of America in 1882-3, for the special purpose of making collections for the Berlin Ethnological Museum. While therefore this volume deals mainly with the ethnology of the region visited, it contains much information on the geography of North-west America, especially in its bearings on the native population.

Paton, William Agnew.—Down the Islands: a Voyage to the Caribbees. London, Kegan Paul & Co., 1888: large 8vo., pp. xiii. and 301. Price 16s.

An account of a short trip to the Caribbean Islands. After briefly relating the incidents of the voyage out from New York, Mr. Paton proceeds to describe each place as visited, including—St. Christopher, Antigua, Dominica, Mar-

tinique, Barbados, Surinam, Demerara, Trinidad, Grenada, St. Lucia, Montserrat, and Nevis. The illustrations are from drawings by M. J. Burns.

Petitot, Émile.—*En route pour la Mer Glaciale.* Paris, Letouze [1888]: 8vo., pp. 394. [Presented by the Author.]

In this volume we have a further instalment of Abbé Petitot's manifold experiences when labouring as a missionary among the natives of the northern territories of the Dominion. In the first part the author describes his experiences in the region of the upper Mississippi, the second part being devoted to his journeys in the Canadian Dominion. As in the Abbé's other works, there is much information both as to country and people, with, in addition, many references to the past of North America when France was dominant there.

Robertson, J. P.—*A Political Manual of the Province of Manitoba and the North-west Territories.* Winnipeg, 1887: 8vo., pp. 209, map and illustrations. [Presented by the Author.]

Sievers, [Dr.] W.—*Die Sierra Nevada de Santa Marta und die Sierra de Perijá.* Zeitschrift der Gesellschaft für Erdkunde zu Berlin, Nos. 133, 134. Berlin, 1888: pp. 1-158.

This paper contains the scientific results of Dr. Sievers' journey in Northern Colombia, the narrative of which has been already published (*Proc. R.G.S.*, 1887, p. 521). In the present paper the author works out the geology, physical geography, altitudes, climate, vegetation and agriculture, population and political geography of the region which he visited. The memoir is accompanied by a map, on the scale of 1:500,000, of the Sierra Nevada de Santa Marta.

AUSTRALASIA.

[**Australia.**].—*The Australian Handbook (incorporating New Zealand, Fiji, and New Guinea) Shippers' and Importers' Directory and Business Guide for 1888.* London, Melbourne, Sydney, Brisbane, 1888: 8vo., pp. 589, maps and plans. Price 10s. 6d.

This edition has been revised and corrected to the latest possible date. It contains, as usual, a mass of useful information on the Australian Colonies, including Fiji and New Guinea. One additional feature of the present edition is the "Hundred Years' History of New South Wales."

GENERAL.

Benko, Jerolini [Freiherr von].—*Reise S.M. Schiffes "Zrinyi," über Malta, Tanger und Teneriffe nach Westindien in den Jahren 1885 und 1886.* Pola, Carl Gerold's Sohn, 1887: 8vo., pp. vii. and 276. Price 4s. [Presented by the Publishers.]

Apart from the training of the crew, the principal object of the Austrian Imperial ship the *Zrinyi*, in visiting Malta, Tangiers, Teneriffe, and the West Indies, was to collect data concerning the economical and commercial conditions of these places, with a special view to the development of Austrian trade. The result is a systematic account of the geography, history, social, and commercial conditions of most of the West India Islands, valuable not only for the information thus conveyed, but for the light in which the British West Indies are regarded by a foreigner. There is a good map showing the route of the vessel.

Coen, Gustavo.—*Le Grande Strade del Commercio Internazionale proposte fino del Sec. xvi.* Livorno, Vigo, 1888: 8vo., pp. xi. and 504. [Presented by the author.]

Signor Coen shows, as the result of much research, that at the end of the 16th century the Suez Canal, the Panama Canal, and the land route to India were already in contemplation. In the second part of the book he enters in detail on the modern aspect of these three projects. The work is a useful contribution to a knowledge of changes in trade-routes from the middle ages downwards.

Harrisse, Henry.—Christophe Colombe et Savone. Gênes, Donath, 1887: 8vo., pp. 111. Price 5s. (*Dulau.*)

In a recent edition of the 'Memorie Particolari' of Verzellino, the editor, the Rev. Andrea Astengo, endeavours to prove that Columbus was born at Savona. M. Harrisse in this *brochure* sets himself to the somewhat unnecessary task of proving that this could not possibly be the case.

Isvestija Imperatorskago Russkago Geographicheskago obshestva, tom. xxiii. vyp. 5. Proceedings of the Imperial Russian Geographical Society, vol. xxiii, fasc. 5. St. Petersburg, 1887.

The present number opens with a preliminary report on the expedition to the New Siberian Islands, by A. A. Bunge. The results here communicated have been for the most part already summarised in our 'Proceedings' (1887, p. 577). With regard to the climate of this group of islands situated so far north, it is worth while mentioning that winter, accompanied by violent winds and "blizzard," continues from the middle of August to June, and on the 16th October there were $-34^{\circ}6$ Fahr. The condition of the ice all along those coasts, says Dr. Bunge, has been such as to have precluded the possibility of any ship passing that way since Nordenskiöld's voyage in the *Vega*. The next article is an address delivered before the united Mathematical and Physical Sections by Dr. Z. Y. Petri, late professor of geography and anthropology at the University of Bern, and now professor in the same subjects at the University of St. Petersburg. Dr. Petri's essay is an able review of the many disquisitions on the aims and scope of geography that have taken place within the last few years. He insists upon a solid groundwork of natural science for the study of the subject. Whilst denying that the two fathers of modern geography, Humboldt and Ritter, were antagonistic in their treatment of the subject, he traces even in their writings the two currents—the historical and physical—flowing side by side, now one and now the other taking the lead as the exponent of this or that system was the stronger. The idealists represented by Ritter, the materialists by Humboldt, all worked, however, towards one common end. A third great worker whose influence is still felt, Oscar Peschel, was no antagonist of Ritter, though his style was more that of a brilliant polemical writer than a geographer, and it is inapposite to attribute to his school the formula—"True geography is the description of nature," since he laid as much stress on the historical as on the physical side of the subject; the one, he said, is complementary of the other; the two currents of our science must be united in one channel, and must take in the whole universe as the field of their investigations. Coming down to more recent times, Dr. Petri shows that Richthofen and the English geographers are wrong in trying to specialise geography by attempting to define its limits. In these days, when all sciences struggle for autonomy, when every place is filled in terrestrial geography by meteorologists, hydrographers, topographers, botanists, zoologists, and a host of others, all claiming to be regarded as specialists, the geographer is forestalled—there is in fact no room for him. This is the result of mistaken theories as to the part the geographer is called on to play. Geography must on no account try to find some unoccupied province of knowledge. Its range is the world, its material—the investigations of specialists in all branches of science, its business—to collect that material into one comprehensive whole and apply it to any part of the earth. Dr. Petri proceeds to explain his method of treating the subject, and defines geography not as "naturwissenschaftlich-historische Disciplin," as Richthofen would have it, but in its wider aspect, as "naturwissenschaftlich-philosophische Disciplin."

The next article is on a Montenegrin's view of the universe, part ii., by P. A. Rovinsky. Space will not allow of more than a passing mention of it. A. M. Nikolsky contributes a report in six chapters on the fisheries of the Aral basin, giving the results of a special government commission to inquire into the subject. M. Nikolsky describes the modes of fishing and the various implements used by the native Kara-kalpak fishermen. He estimates the annual take of fish as worth 305,000 rubles, or about 25,000*l.*, and does not

regard the future development of this industry as promising, though the geographical position of the Aral, more especially when steamboat and railroad communications are completed, will in all probability secure for its fisheries a large local consumption in the towns of Turkistan.

Koschitzky, Max [von].—*Deutsche Kolonialgeschichte.* Leipzig, Froberg, 1887–8: 2 vols. 8vo.; i., pp. [4] and 301; ii., pp. [4] and 333. Price 12s. (Dulau.)

This is a useful sketch of the history of German colonial enterprise from the earliest times down to the present date. The first volume deals, among other subjects, with the settlements in Curland and Livonia, the Hanseatic League, the Dutch as colonisers, emigration, German colonies in Russia and Brazil, German Christian missions, the German navy, German foreign trade, with special chapters on the latest phase of German colonisation. The second volume deals in detail with recent German colonial enterprise in various parts of the world.

Whitney, J. D.—*Names and Places. Studies in Geographical and Topographical Nomenclature.* Cambridge [U.S.] University Press, 1888: 8vo., pp. 239. [Presented by the Author.]

This is a little *livre de luxe*, only 100 copies being printed, the copy presented to the Society being No. 59. The book, however, is as useful as it is ornamental, and is a contribution of much value to the history and precise signification of geographical terms, general and special. In the first section Prof. Whitney traces the origin of "Appalachian," "Cordillera," and "Oregon." In this as well as in the rest of the book he succeeds in conveying much interesting and useful information on the development of geographical knowledge. So late as 1794, in the leading American geographical text-book, the Alleghanies are set down as "the most considerable" mountains in North America. "The Andes and Alleghany Mountains are probably the same range interrupted by the Gulf of Mexico." In a later edition, in 1804, the Rocky Mountains are vaguely referred to as the "Shining Mountains" lying "away west of Louisiana." The bulk of the book treats generally of topographical nomenclature, dealing first with general terms like Sea and Ocean; there being separate sections on Mountains, Peaks, and Sierras; Valleys, Gorges, and Cañons; and Plains, Prairies, and Savannas. There is a useful index of the topographical names referred to in the text.

Zapiaki Imperatorskago Russkago Geographicheskago obshestva. Po obschei geographii, tom. xv. Nos. 4, 5, 6, and 8. Memoirs of the Imperial Russian Geographical Society. General Geography, vol. xv., parts 4, 5, 6, and 8. St. Petersburg, 1886–7.

Part 4, pp. 59, gives the results of the hydrometrical and hydrographical surveys in 1879 of the Upper and Central Amu-daria by N. Zubof. The author ascended the Amu-daria by boat from Petro-Alexandrofsk to the rapids on the Pandj, near the ruins of Fort Faizabat (in long. 69° E.), where this river ceases to be navigable, a distance of 661 miles. From this point he began to descend, taking measurements and soundings at frequent intervals. A profile is given of the river showing the heights in metres, and tables are added showing the average depth, velocity of current, and fall per verst.

Part 5, pp. 37, with a map and two plates of drawings, contains a paper by D. F. Jarintsof on the causes of landslips of precipitous parts of the sea-coast near Odessa, and the measures which should be taken to prevent the destruction of the electric lighthouse near that city.

Part 6, pp. 15, with 1 plate of drawings, on placing thermometers in order to determine the temperature and humidity of the air, by R. Savélief.

Part 8, pp. 37, some contributions to the theory of probabilities in meteorology, by J. A. Kleiber.

Same series, vol. xvii., Nos. 1, 2, 4, and 5. St. Petersburg, 1887.

No. 1, pp. 169, with a map, The northern Ussuri country, by Lieut.-Col. I. Nadarof, of the Staff Corps. The author was ordered in 1882 to survey an

No. III.—MARCH 1888.¹

o

inland military road from the mouth of the Iman across the head-waters of the Vak and central course of the Ula-ho to the valley of the Daubi-ho, and at the same time to report on the economical and strategical capabilities of the region passed through. In 1883 he continued his survey along the river Ussuri from the confluence of the Ula-ho and Daubi-ho to the mouth of the Sungatch, 50 miles up the Kia and 80 miles up the Khor rivers. He gives statistics of the population, Oroncho, Goldi, and Chinese, a record of meteorological observations, and a vocabulary of Oroncho words. The Cossack inhabitants along the Ussuri numbered on the 1st January, 1884, only 2834 of both sexes; and until the country is further colonised by Russians it will remain what it is at the present day, an unexplored wilderness.

No. 2, pp. 22, remarks on the drought of 1885, by A. I. Voiékof, from materials supplied to the Society from many parts of Russia.

No. 4, pp. 133, The most ancient channels of the Amu-daria, by A. V. Kaulbars, with a map and 3 plates of sectional drawings. The author, previously well known by his work on a kindred subject—the lower Amu-daria, has availed himself of recent surveys in the Aralo-Caspian plains, to examine once more the interesting though somewhat intricate questions of the old Oxus channels. He finds in the new data now collected a confirmation of the opinions already expressed by him as to the causes which have deflected the Amu and Syr-daria from their courses, viz. the formation of terraces of deposits; and he further finds an explanation and corroboration of what he had only hinted at before, viz. of a southern Oxus channel running parallel with the Kopet-dagh into the Caspian. The physical characteristics along the central Amu-daria offer a close analogy to those nearer its mouth, except that the oases of Chardjui, Kerki, and Kelif are smaller (in a diminishing ratio as we ascend the river) than that of Khiva, having had longer to contend with the drift sands that are everywhere encroaching upon the cultivated tracts. The author concludes by answering the objections urged against his theories by M. Konshine in the Tiflis press, and cites old authorities in their support.

No. 5, pp. 115, with three maps, on fixing latitudes by corresponding altitudes of two stars, by M. V. Pevtsof.

Same series, vol. xiii. pp. xix. and 383, St. Petersburg, 1886. Orographical sketch of the Pamir Mountain System, by N. A. Sévertsof, with a portrait of the author, 29 full-page illustrations (mostly from photographs), besides woodcuts and maps.

This posthumous work of the explorer of the Thian Shan has been published under the supervision of J. Mushkétov, the maps having been revised by Stubendorf. The general map at the end presents some novel and interesting features. The limits of the mountain systems—the Pamir in the centre, the Thian Shan on the north, and the Indian, Iranian, and Tibetan ranges on the south—are shown in colour; valleys above 11,000 feet and above 8,500 feet are also coloured in two shades; the mountains are not shaded, but the directions of the ridges are given, a distinction being drawn between snowy and snowless ranges. The contents of the work are as follows:—(1) a biographical sketch of N. A. Sévertsof, by M. Mensbir; (2) general characteristics of the Pamir system as compared with the Thian Shan; (3) the inner Pamir; (4) mountain masses of the inner Pamir; (5) the western borders of the mountainous inner Pamir; (6) the southern slope of the Pamir; (7) a critical review of the most recent English information on Badakhshan and the neighbouring parts of the inner Pamir; (8) conclusion. The criticisms in part 7 are chiefly directed against General Walker's map of Central Asia (1883 ed.), or rather against the surveys of the native explorer M. S., upon which part of it is based (see 'R. G. S. Proceedings,' 1884, pp. 507-9). On comparing the itineraries of the Havildar, Colonel Matvéief, and M. S., considerable discrepancies are noticed, but preference must be given to Matvéief's work in North-western Badakhshan, this being a plane table survey conducted openly without any attempt at concealment, whereas the native Indian explorers merely write down their itineraries with every desire to escape detection. Matvéief too connected his survey with positions astronomically fixed by Schwartz.

In conclusion, Sévertsof claims for his Pamir system, with its thirty ramifi-

cations, a separate orographical existence, distinct from the Thian Shan on the north and the Tibetan ranges on the south, but comprising the Hindu Kush as far as the mouth of the Kabul-daria and the upper right valleys of the Indus. Space will not allow of our examining the grounds on which this theory is founded; but M. Sévertsof's views, founded as they are on personal knowledge, will doubtless be considered by geographers with every attention.

Same series, vol. x., part 2. St. Petersburg, 1887. *Posoilstvo k Ziungarskomu Khung-taidji Tsevan Rabtanu Kapitana Unkovskago*. The Embassy of Captain Unkofsky to the Dzungar Khung-taidji Tsevan Rabtan, and his diary in 1722-24. Edited with notes and preface by N. I. Vesselofsky, pp. xlv. and 276, with index, facsimile Kalmuk letters and Unkofsky's map.

This is a work of historical interest relating to the period of the first efforts of the Russians, under the auspices of Peter the Great, to move southward from the Irtysh towards the gold-fields of Eastern Turkistan or Kashgaria and India. Unkofsky was sent on a mission to the Khan of the Kalmuks, at that time in possession of Yarkand, and at war with China. His journal contains interesting particulars of the mode of life of the Dzungars, their character, religious ceremonies, &c. Though referred to by the historians of Siberia, Müller and Fischer, Unkofsky's journal is now for the first time printed *in extenso*, and well edited, translations, both contemporary and modern, being given of the Kalmuk documents.

NEW MAPS.

(By J. COLES, *Map Curator* R.G.S.)

WORLD.

Peutinger'sche Tafel.—Weltkarte des Castorius genannt die ——. In den Farben des Originals herausgegeben und eingeleitet von Dr. Konrad Miller, Professor am Realgymnasium in Stuttgart. Ravensburg, Verlag von Otto Maier (Dorn'sche Buchhandlung), 1888. With explanatory text. Price 6s. (*Williams and Norgate*).

This is the reproduction, in the original colours, of a manuscript in the Imperial Library of Vienna, which is said to have been executed in the thirteenth century, by a monk of Colmar, and which was discovered at Worms by Conrad Peutinger in 1507. It is accompanied by a volume of letterpress, and has the modern names of the places which appear on the map, given immediately below them on the margin.

EUROPE.

Bayern.—Topographischer Atlas des Königreich —, bearbeitet im topogr. Bureau d. K. b. Generalstabes. Scale 1:50,000. München. Blatt 59, Elchingen Ost. 60, Dillingen Ost. 67, Weissenhorn Ost. 68, Burgau Ost und West. Price 2s. each sheet. (*Dulau*.)

Böhmen.—Fischerei-Karte des Königreich —, von Dr. A. Frič mit erläuterndem Text. Veröffentlicht mit Subvention des hohen Landtages und der Comite's für Landesdurchforschung. Prag, Rivnač. Price 6s. (*Dulau*.)

Deutschen Wasserstrassen.—Karte der — unter besonderer Berücksichtigung der Tiefen- und Schleusenverhältnisse. Im Auftrage Sr. Excellenz des Herrn Ministers der öffentl. Arbeiten in Preussen herausgegeben. Unter Benutzung der

Liebenow'schen Karte von Central-Europa nach amtlichen Quellen bearbeitet von Sympher u. Maschke, Königl. Regierungs-Baumeister. 4 Blätter koloriert. Scale 1 : 1,250,000 or 17·1 geographical miles to an inch. Berlin, 1887. Verlag des Berliner Lith. Instituts (Julius Moser). Price 7s. 6d. (*Dulau.*)

This is a clearly drawn map, from which by means of the system of colouring, and a given scale, it is possible to measure the depths of any of the rivers or canals; the length and capacity of the locks can also be ascertained, as they are all drawn to a given scale. The number of persons who annually navigate the Continental rivers and canals in yachts of light draught has of late years been steadily increasing, and to these this map would be of great service in enabling them to ascertain what parts of Germany they could visit by the existing waterways.

Oesterreichisch - Ungarischen Monarchie. — Specialkarte der —. Scale 1 : 75,000 or 1 geographical mile to an inch. K. k. militär-geografisches Institut, Wien. Sheets: Zone 13, Col. XXII. Arló und K. Terenne; 14—XXVI. Nagy-Kálló und Nyér-Bátor; 14—XXVIII. Kányaháza und Szatmár-Németi; 20—XXV. Apatelek und Simánd; 20—XXVI. Borosjenő und Buttyin; 29—XI. Zapuntello; 29—XIII. Novegradi und Benkovac; 30—XIII. Zaravecchia und Stretto; 30—XXI. Zabukvica. Price 1s. 4d. each sheet. (*Dulau.*)

—— Uebersichtskarte der — nebst den angrenzenden auswärtigen Landestheilen. Herausgegeben im Auftrage d. K. K. Handelsministers von der K. K. General-Inspection der oesterreichischen Eisenbahnen. Scale 1 : 1,000,000 or 13·6 geographical miles to an inch. 6 Blätt. Wien. Price 12s. (*Dulau.*)

Italia.—Carta d' —. Scales 1 : 25,000 or 2·9 inches to a geographical mile, and 1 : 50,000 or 1·4 inches to a geographical mile. Istituto Topografico Militare, Firenze. Sheets: 31—I. Gaviate, IV. Pallanza; 35—II. n.e. Bocca di Navene, II. n.o. Malcesine, II. s.e. Monte Baldo, II. s.o. Castelletto di Brenzone, III. n.e. Valle S. Michele, III. n.o. Bagolinò, III. s.e. Gargnano, III. s.o. Idro; 36—I. n.e. Monte Verena, I. s.e. Rotzo, I. s.o. Lastebasse, II. n.e. Arsiero, II. n.o. Posina, II. s.e. Schio, II. s.o. Recoaro, III. n.e. Piano delle Fugazze, III. s.e. Monte Obante, III. s.o. Monti Lessini; 37—IV. n.e. Monte Lissier, IV. s.e. Valstagna; 22 e 37—III. s.o. e IV. n.o. Cime Undici e Dodici; 37—IV. s.o. Asiago; 48—I. n.e. Breonio, I. n.o. Caprimo Veronese, I. s.o. Bardolino, II. n.o. Castelnuovo di Verona, II. s.o. Valeggio sul Mincio, III. n.e. Peschiera sul Lago di Garda, III. n.o. Lonato, III. s.e. Cavriana, III. s.o. Castiglione delle Stiviere, IV. n.e. Toscolano, IV. n.o. Salò, IV. s.e. S. Vigilio, IV. s.o. Manerba; 49—I. n.e. Malo, I. n.o. Valdarno, I. s.e. Arzignano, I. s.o. Chiampo, II. n.e. Montebello Vicentino, II. n.o. Soave, II. s.e. Lonigo, II. s.o. San Bonifacio, IV. n.e. Salva di Progno, IV. n.o. Bosco Chiesanuova. Price 7d. each sheet. (*Dulau.*)

Yorkshire.—Map of —. Physical and Political. Designed by Fred. D. King, Bradford. Scale 1 : 140,000 or 1·9 geographical miles to an inch. Published by E. J. Arnold, School Stationer, Leeds. On rollers.

It will doubtless be within the memory of many of our Fellows that the Society's collection of appliances in use in geographical education was lent to the Bradford School Board for exhibition in that town. When the exhibition was opened to the public, Mr. J. Scott Keltie, the Society's Inspector of Geographical Education, delivered an address on points suggested by the collection, and amongst other things dwelt on the importance of an improvement in the production of maps designed for elementary education, at the same time giving a general sketch of the system of colouring and symbols which he considered it desirable to employ. We refer to this, as the map under consideration is the direct outcome of Mr. Keltie's remarks on that occasion, and shows a very marked improvement on most of the maps of its class that have come under

our notice. The following are some of the points worthy of attention:—All the great plain of York and all parts of the country below 200 feet are coloured buff; the sea and rivers, as far as the tidal influence extends, are tinted blue, hills and higher levels are shaded black on a white ground, and the relative populations of towns are indicated by circles of proportionate areas. In addition to this, roads, railways, boundaries, &c., are laid down. Although there is room for improvement in the style of hill-shading, yet, taken as a whole, the map is a most creditable production, and is well suited for the purpose of giving elementary instruction in geography in the lower standards of board schools.

ORDNANCE SURVEY MAPS.

Publications issued during the month of January 1888.

1-inch—General Maps:—

ENGLAND AND WALES: New Series. 98, outline, Cheshire and Derbyshire, portions only; containing Altringham, Bollington, Knutsford, Stockport, &c. 99, outline, Cheshire and Derbyshire, portions only; containing Chapel-en-le-Frith, Tideswell, the Peak (Derbyshire), &c. 122, outline, containing Audlem, Holt, Malpas, Nantwich, Whitchurch, &c. 248, outline, containing Llantrisant, Maes-Teg, Mountain Ash, Pontypridd, the Rhondda Valley, &c. 359, outline, containing Helston, Mullion, and the Lisard, &c., 1s. each.

IRELAND: 193 (Hills), 1s.

6-inch—County Maps:—

ENGLAND AND WALES: Anglesey: 12 S.E.; Cambridgeshire: 7 N.E., containing Wisbech; Cardiganshire: 34 S.E., 42 N.W.; Carmarthenshire: 1 S.E., 8 N.W.; Cornwall: 24 S.E., 57 N.W., 61 N.E. and S.E. on one sheet, containing St. Ives; 61 S.W., 62 N.W., S.W., S.E., 67 N.W., N.E., 73 N.E., 73A S.E., and 78A N.E. on one sheet, 74 N.W., containing Penzance, 74 N.E., containing Marazion, 74 S.W., 77 S.E., 78 N.E. and S.E., on one sheet, 78 S.W. Devonshire: 101 S.W.; 1s. Dorsetshire: 22 S.E., 26 S.E., 30 N.W., N.E., S.W., S.E., 31 N.E., 8W., S.E., 32 N.W., S.W.; 1s. each. Herefordshire: 41 S.W., 47 S.E., 53 S.E.; 1s. each. Huntingdonshire: 2 S.W., 4 N.E., 9 N.W., S.W., 13 N.E., S.W., S.E., 16 S.W., 17 N.E.; 1s. each. Leicestershire: 35 S.W.; 1s. Lincolnshire: 61 N.E., 100 N.W., N.E., S.W., 103 S.E., 122 S.W., 123 S.W., S.E., 126 S.W., 130 N.E., 131 S.W., 132 N.E., 133 N.W., N.E., S.W., S.E., 139 S.W., 144 S.E., 153 N.E.; 1s. each. Merionethshire: 21 N.E., 40 S.E., 41 N.W., N.E., 42 S.W., 43 N.W., N.E.; 1s. each. Montgomeryshire: 19 N.W., N.E., S.E.; 1s. each. Norfolk: 65 N.E.; 1s. (Norfolk is now complete on the 6-inch scale in 387 quarter-sheets at 1s. each). Somersetshire: 58 S.E., 59 N.W., 70 S.W.; 1s. each. Staffordshire: 5 S.W., 9 N.W., 30 N.E., S.E., 31 N.W., S.W.; 1s. each. Suffolk: 12 S.E.; 1s. Wiltshire: 54, containing Amesbury, Durrington, and Stonehenge; 2s. 6d.

25-inch—Parish Maps:—

ENGLAND AND WALES: Brecknockshire: XXVI. 3, 15, XXIX. 1, 2, 3, 5, 6, 7, 10, 11, 13, 14, XXXII. 3, 11, XXXIII. 2, 5, 6, 9, 10, 11, 14, 3s. each; XXXIV. 7, 4s.; XXXIV. 8, 9, 10, 12, 15, 16, XXXV. 1, 5, 6, 9, 12, 13, 14, 15, 16, XXXVI. 5, 9, 13, XL. 8, XLII. 1, 3s. each. Cambridgeshire: X. 3, 4, 3s. each; X. 12, XI. 5, XII. 14, XIV. 12, 16, XV. 1, 4s. each; XVI. 8, 3s.; XVII. 14, XXI. 11, XXV. 6, 4s. each; XXV. 12, 15, 16, XXX. 2, 3s. each; XXXIII. 4, 4s.; XXXIII. 10, 11, 14, 16, XXXVIII. 2, 3, 5, 10, 12, 16, 3s. each. Cardiganshire: IV. 14, 3s. Carmarthenshire: VIII. 9, 13, 14, XVI. 2, 4, 9, 12, 13, 14, XLI. 8, 3s. each. Devonshire: XX. 9, 10, 13, 14, CXX. 14, CXX. 1, 2, 3, 4, 5, 3s. each; CXX. 6, 4s.; CXX. 7, 8, 10, 11, 3s. each; CXX. 12, 4s.; CXX. 13, 14, 15, CXXIV. 1, 3s. each. Area Book, Walkhampton, 1s. 6d. Dorsetshire: IX. 12, XII. 1, 3, 3s. each; XIII. 4, XIV. 14, 4s. each. Gloucestershire: XXVI. 7, 8, 11s. 6d. each. Herefordshire: XXIV. 6, XXXVII. 3, 4, 7, 8, 3, 5, 3s. each. Huntingdonshire: VI. 16, 4s.; XXVI. 2, 3, 6, 10, 3s. each. Leicestershire: XLIII. 6, 4s.; XLIII. 7, 8, 12, XLVIII. 2, 10, LII. 12, 3s. each; LII. 16, 4s. Lincolnshire: XIII. 6, 10, XXI. 1, 2, 5, 14, 15, XXIX. 1, 6, 8, 3s. each; XXIX. 13, 4s.; XXIX. 15, XLVI. 4, 7, 8, LXII. 3, 4, 7, 8, 3s. each; LXXXVIII. 2, 4s.; LXXXVIII. 3, 6, 7, 8, 10, 11, 12, 13, 3s. each; LXXXV. 4, 4s.; LXXXV. 7, 3s.; LXXXV. 8, 4s.; LXXXV. 12, 15, 16, LXXXVI. 1, 2, 4, 5, 9, 3s. each; LXXXVI. 11, 4s.; LXXXVI. 12, 15, 16, XCV. 2, 7, 8, 10, 12, 3s. each; XCV. 13, 4s.; XCV. 14, 15, XCVI. 3, 4, 3s. each; XCVI. 6, 4s.; XCVI. 8, 3s.; XCVI. 9, 4s.; XCVI. 10, 11, 12, 14, 15, 16, 3s. each. Merionethshire: XXIII. 6, XXXV. 3, 3s. each. Montgomeryshire: VII. 3, IX. 8, XII. 4, XX. 1, 2, 5, 6, 9, 10, 14, XXVI. 5, 16, XXVII. 13, 14, XXXIII. 4, XXXIV. 1, 2, 5, 3s. each. Norfolk: XXI. 11, 14, XXXII. 1, 3s. each; XLIV. 3, 4, 14, LXVIII. 2, 6, LXXX. 11, 14, 4s. each. Northamptonshire: XXI. 16, 4s.; XXVIII. 11, 12, 16, 3s. each. Nottinghamshire: XXXVI. 2, 3s.; XXXVI. 13, 4s. Somersetshire: XXX. 11, 3s.; XXXVII. 11, 4s.; XXXVII. 16, 3s.; XXXVIII. 4, 7, 8s. each; XXXVIII. 11, 12, 16, 4s. each; XLI. 9, 13, LXXXI. 5, 3s. each; LXXXVIII. 4, 4s.; LXXXVIII. 9, 3s.; LXXXIX. 14, 4s. Staffordshire: Area Books, Bushbury, 2s.; Codsall, 1s.; Darlaston, 1s.; Old Swinford (part of), Penn. 1s. 6d. Warwickshire: XVIII. 2, 10, 13, 14, XXII. 2, 4, 6, 7, 3s. each; XXII. 10, 4s.; XXII. 11, 13, 15, 16, XXIII. 11, 12, 3s. each; XXIII. 16, 4s.; XXV. 3, 4, 8, 11, 15, 16, XXVI. 1, 2, 3, 4, 5, 8, 12, 3s. each; XXVI. 15, XXVII. 3, 4s. each; XXVII. 4, XXVIII. 11, 12, XXXII. 7, 3s. each. Wiltshire: XXXII. 9, 3s.; XXXII. 14, 5s.; XXXVIII. 8, 11, 4s. each; LI. 14, LVI. 4, 15, LVII. 5, LIX. 15, LXV. 8, 10, 3s. each; LXV. 12, 4s.; LXIX. 6, 3s.; LXX. 8, 4s.; LXX. 16, LXXI. 1, 5, 3s. each. Worcestershire: Area Books, Bockleton, Kyre Magna, Kyre Parva, Lower Sapay, 1s. each; Old Swinford (part of), 1s. 6d.; Pedmore, 1s.

Town Plans—10-foot scale:—

ENGLAND AND WALES: Birmingham and Environs, XIII. 8, 20, 25; XII. 7, 3, 4, 17, 18, 19, 20, 24, 25; XIII. 11, 5, 10; LXXII. 3, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 23, 24; LXXII. 11, 4, 2s. each. Bridgwater, L. 10, 18, 2s. (Bridgwater is now complete in 33 sheets at 2s. each.) Dorchester, XL. 15, 3, 8, 9, 17, 23; XL. 16, 16, 2s. each.

(Stanford, Agent.)

ASIA.

Neusibirischen Inseln.—Karte der — und des Jana-Landes. Zur Übersicht der Reiserouten einer von Dr. Alexander Bunge u. Baron Eduard Toll 1885 u. 1886 ausgeführten Expedition der Kaiserl. Russ. Akademie der Wissenschaften, nebst Angabe der Routen früherer Reisender. Scale (central) 1 : 3,000,000 or 41·6 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1888, Taf. 4. Gotha, Justus Perthes, 1888. (*Dulau.*)

AFRICA.

Abissinia.—Carta della guerra in —. Scale 1 : 200,000 or 2·7 geographical miles to an inch. Milano, Dott. F. Vallardi. Price 1s. (*Dulau.*)

Nil-Länder.—Karte der —, vom Aequator bis zum Mittelmeer, mit Plänen von Massaua und Umgegend nach neuesten Aufnahmen bearbeitet. Glogau, Flemming. Price 1s. 6d. (*Dulau.*)

AMERICA AND WEST INDIES.

Haïti Island.—Croquis des Weges von Jarabacoa bis Pico del Valle, Sto. Domingo, von Baron H. Eggers, 1887. Scale 1 : 250,000 or 3·4 geographical miles to an inch. With an inset map of the island of Haïti, scale 1 : 7,500,000 or 102·7 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1888, Tafel 3. Gotha, Justus Perthes. (*Dulau.*)

Southern California.—Large-scale Sectional Map of —, embracing the countries of Santa Barbara, Ventura, Los Angeles, San Bernardino, and San Diego. Scale 1 : 390,000 or 5·2 geographical miles to an inch. Rand, M'Nally & Co., Chicago, 1888. (*Trübner.*)

Of late years, owing possibly to the increased facilities of railway communication, much attention has been directed to Southern California as a health-resort, and the want of a map such as that before us has doubtless been felt by those who have decided to visit this country either in search of health or pleasure. In addition to the usual information as to means of communication, which has been brought up to date, the different survey sections are laid down, and an index to all the towns of Southern California is given, with the aid of which the position of any place on the map can be found without the slightest difficulty. The map folds up to a convenient size for carrying in the pocket, and is clearly drawn.

United States.—Photograph of a model, exhibiting the plateau of the Pacific Ocean adjacent to the coast of the United States, and also the orography of the Pacific Coast west of the 118th meridian. Prof. Geo. Davidson (Pres. Geogr. Soc. Pacific), San Francisco.

Venezolanischen Cordillere.—Dr. W. Sievers' Original-Routenkarte der —, im Maasstabe von 1 : 1,000,000 or 13·6 geographical miles to an inch, bearbeitet u. gezeichnet von L. Friederichsen. Hamburg, 1887. Price 4s. (*Dulau.*)

AUSTRALIA.

New South Wales.—Rowley's Map of the Colony of —. Scale 1 : 507,550 or 6·9 geographical miles to an inch. Compiled and published by G. B. Rowley, Public Draftsman. G. K. Clark, agent. Sydney, N.S.W., 1886 and 1887. On rollers, varnished.

On this map are shown the divisions of runs, land district, and chairman's district boundaries under the Crown Lands Act of 1884, all means of communication, cities, towns, and topographical features. The data used have been obtained from the Department of Lands and the Surveyor-General's Office. Evident care has been taken in the compilation, and Mr. Rowley has produced an excellent map for all purposes of reference in matters connected with land in the Colony of New South Wales.

CHARTS.

North Atlantic Ocean.—Synchronous Weather Charts of the North Atlantic and the adjacent Continents, for every day from 1st August 1882 to 31st August 1883. Published under the authority of the Meteorological Council. Part III. From 15th February to 24th May 1883. London, Eyre & Spottiswoode. Price 17s.

This is the third part of this valuable atlas. The data on which the charts have been constructed have been obtained from observations extending over a period of thirteen months, from August 1st, 1882, to August 31st, 1883, collected from a very large number of ships, and making in all no less than 11,236 returns. The period embraced is that during which the international system of circumpolar observations was being carried out, and thus data have been obtained from very high northern latitudes which could not otherwise have been procurable, and which render the charts not only more complete, but of an exceptional value not likely soon to be equalled. The charts are drawn on the conical projection, and have been reduced from originals on the scale of 1 inch to 180 nautical miles. There are two charts for each day, one to show the barometric pressure, the wind, and the weather; the other to show the temperature of the air and sea, and the weather. A key chart has been given, showing the positions and names of the various circumpolar stations, and of mountain stations with their heights in feet, also the names of islands or coast stations other than those which have been employed in the drawing of isobars and isotherms by the North American or European meteorological authorities in preparing their daily charts. On these charts the north-east coast of South America is shown, as it most probably affects the wind and weather in the neighbouring part of the North Atlantic.

Service Hydrographique de la Marine, Paris.—No. 4180, Golfe du Tonkin: Chenaux Intérieurs de l'Archipel des Fai-Tsi-Long entre l'Île du Colosse et Ké-Bao, 1887.—4182, Golfe du Tonkin: Chenaux Intérieurs entre la Baie de Ha-Long et le Lakh-Huyen, 1887.—4181, Golfe du Tonkin: Canaux Intérieurs aux Environs de Fu-Tai-Mun et Ak-Hoi, 1887.—4185, Golfe du Tonkin: Baie d'Ha-Long et Port Courbet, 1887.—4191, Tunisie: De Ras-al-Fortas à Kelebia, presque Île du Cap Bon, 1887.—4198, Tunisie: Du Cap Blanc au Cap Farina, Baie et Lac de Benzert, 1887.—4086, Tunisie, Côte Est: Mahedia (Ancienne Africa), 1885, édition de 1887.—4087, Tunisie, Côte Nord: Tabarca, 1885, édition août 1887.—4102, Tunisie, Côte Est: Sousse (Ancienne Adrumète), 1885, édition août 1887.—4183, Tunisie, Ports et Mouillages, Côte Est: Kelibia (Ancienement Aspis ou Clypea), Hammamet, 1887.—4201, Côte Occidentale d'Afrique: Croquis de la Rivière N'Gunie (affluent de l'Ogowé), 1887.—4202, Côte Occidentale d'Afrique: Croquis du Haut Ogowé entre Lambaréné et N'Djolé, 1887.—4192, Mouillages dans le Nord-Ouest de Madagascar: Îles Glorieuses, Baies à l'Ouest du Cap d'Ambre, Entrée du Port Robinson, Nossi-Bé, Mouillage de Hell-Ville, 1887.—4189, Mer des Antilles: Haïte, Baie St. Marc, 1887. Service hydrographique de la Marine, Paris.

United States Charts.—Pilot Charts of the North Atlantic Ocean, January and February, 1888. Published at the Hydrographic Office, Navy Department, Washington, D.C.; J. R. Bartlett, Commander U.S.N., Hydrographer to the Bureau of Navigation.

ATLASES.

Berghaus' Physikalischer Atlas. (Begründet 1836 von Heinrich Berghaus.) 75 Karten in sieben Abteilungen, enthaltend mehrere hundert Darstellungen über Geologie, Hydrographie, Meteorologie, Erdmagnetismus, Pflanzenverbreitung, Tierverbreitung und Völkerkunde. Vollständig neu bearbeitet und unter

Mitwirkung von Dr. Oscar Drude, Professor am Polytechnikon in Dresden, Dr. Georg Gerland, Professor an der Universität in Strassburg, Dr. Julius Hann, Direktor der K. K. Centralanstalt für Meteorologie und Erdmagnetismus in Wien, Dr. G. Hartlaub, Dr. Med. in Bremen, Dr. W. W. Marshall, Professor in Leipzig, Dr. Georg Neumayer, Geheimer Admiraltätsrat und Direktor der Deutschen Seewarte in Hamburg, Dr. Karl v. Zittel, Professor an der Universität in München, herausgegeben von Prof. Dr. Hermann Berghaus. Vierzehnte Lieferung. Inhalt: Nr. 15, Oceanien. Nr. 26, Westindien. Nr. 43, Änderung der magnetischen Deklination. Gotha, Justus Perthes, 1888. Price 3s. (*Dulau*.)

Sheet No. 15 is a geological map of Oceania, on which are given seven inset maps on enlarged scales of Victoria, Tasmania, Auckland, and volcanic districts in New Zealand and the Sandwich Islands. Sheet 26 contains a general hydrographic map of the West Indies and adjacent coast of America, together with sections compiled from the records of the *Challenger* expedition, showing depths and sea temperatures between Halifax and Bermuda, and New York and Bermuda; in addition to these are several inset maps. Sheet 43 contains four magnetic charts for the years 1600, 1700, 1800, and 1858; these have been respectively taken from the maps of Hansteen, Halley, and the British Admiralty Chart.

Sydow-Wagners Methodischer Schul-Atlas.—Entworfen, bearbeitet und herausgegeben von Hermann Wagner. 60 Haupt- und 50 Nebenkarten auf 44 Tafeln. Gotha, Justus Perthes, 1888. (*Dulau*.)

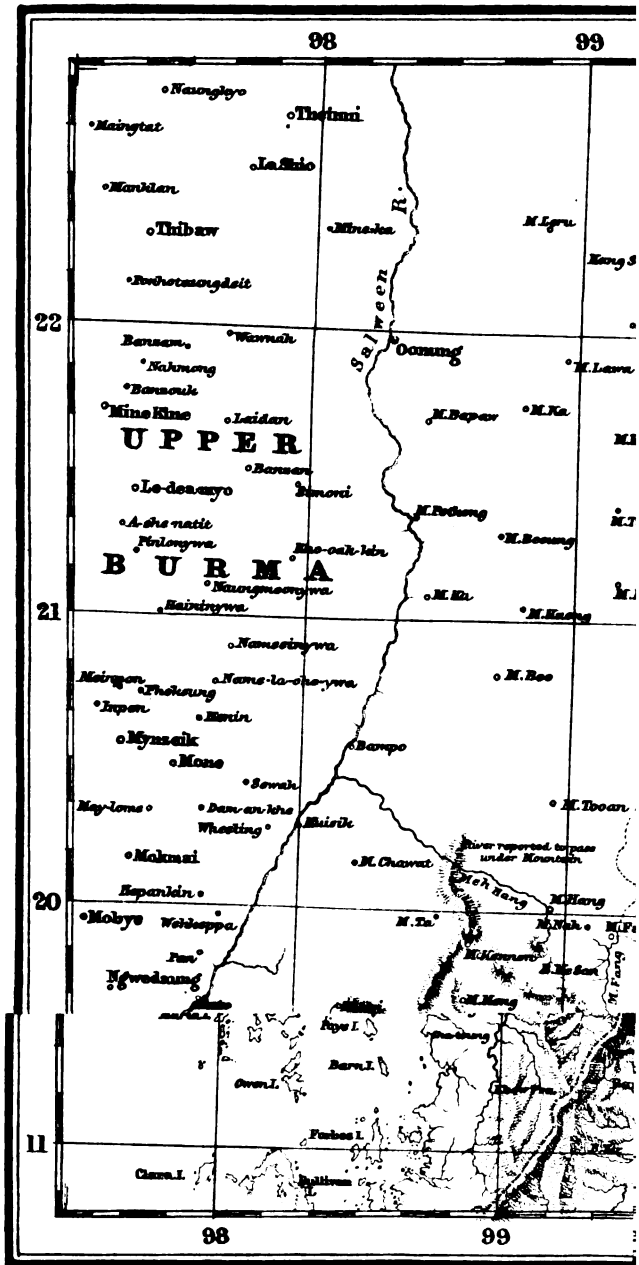
This is in some respects a good example of what an atlas for the use of schools should be. The astronomical diagrams, physical maps and charts are remarkably good, and the sheet devoted to projections is well calculated to convey to the mind of the student the comparative accuracy of delineation in the several projections as applied to maps of different portions of the earth's surface. On sheet No. 5 some excellent specimens of topographical drawing are given, including the systems of hatching, contouring, and colouring, with diagrams illustrating the depths of shade to be used in hill work, and the method of plotting contours.

As might be expected, prominence is given to the German Empire, but this we think should hardly have been done at the expense of so important a country as England, the map of the British Isles being about the most incomplete in the whole atlas, no county boundaries are laid down and very few of the county towns are given; the map, indeed, is quite unworthy of the atlas, and could only be useful to the student in giving him a very rough idea of the physical geography. There are altogether forty-four principal maps, besides many insets, and these are divided into four sections, the first being a general introduction to geography, the second the geography of Europe, and the third and fourth having reference to countries outside of Europe.

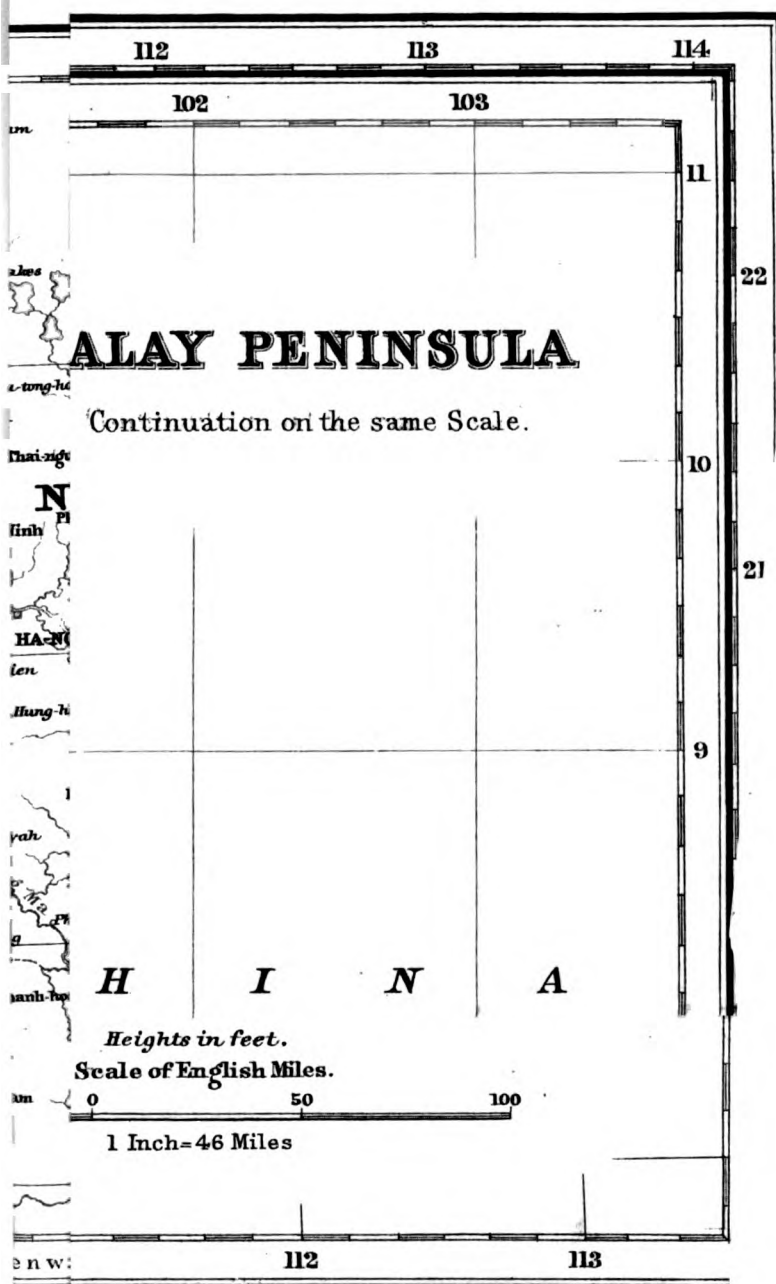
ASTRONOMICAL.

Orrery.—Nouvelle Machine Cosmographique construite par Léon Girod, Breveté à Morbier (Jura). Price 6l. 6s. G. Philip & Son, London, Agent.

This is a very cleverly constructed model for showing the motions of the earth and moon. The manner in which the axis of the earth is kept constant at its proper angle with its orbit, and by which the change of the moon's declination is brought about, is a very ingenious application of mechanics. The workmanship is of a superior character, and were it not for the erroneous notions of space and magnitude which every apparatus of the kind must convey to the mind of a child, it would be well adapted to the purposes of instruction.



H. Sharps, R.G.S., del.



MALAY PENINSULA

Continuation on the same Scale.

H I N A

Heights in feet.

Scale of English Miles.

0 50 100

1 Inch=46 Miles

Edw. Weller, lith. Red. Lion.

ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by Colonel H. H. GODWIN-AUSTEN, F.R.S., J. K. LAUGHTON M.A., and DOUGLAS W. FRESHFIELD, M.A. Contents: Hints on Surveying and Astronomical Observations. John Coles, F.R.A.S.—Meteorology. R. Strachan, F.M.S.—Geology. W. T. Blanford, F.R.S.—Natural History. H. W. Bates, F.R.S., Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.—Anthropology. E. B. Tylor, D.C.L., F.R.S.—Photography. W. F. Donkin, M.A.—Medical Hints. G. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department.—General Outfit. Colonel J. A. Grant, C.B., Edward Whymper, and others. Price, in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, W.; and to be had of Edward Stanford, 55, Charing Cross, S.W.

Instruction for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. Surveying and Mapping, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. Geology, including practical training in the field. By Mr. W. Topley, of the Geological Survey; President of the Geologists' Association. 3. Botany. By Mr. N. E. Brown, of the Herbarium, Kew. 4. Photography. By Mr. John Thomson, Author of 'Photographic Illustrations of China and its People,' and other works.

The lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2s. 6d.

Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers, Vol. II. Part 2.—Now Ready.—CONTENTS:—A Bibliography of Algeria. By Lieut.-Colonel Sir ROBERT LAMBERT PLAYFAIR, K.C.S.I., H.M. Consul-General, Algiers.

. Fellows who have not applied for the Parts as published, can have Vol. I. complete by applying at the offices of the Society, 1, Savile Row, W.

Paper to be read at the Evening Meeting, March 12th:—

The Peaks, Passes, and Glaciers of the Caucasus. By DOUGLAS W. FRESHFIELD, Hon. Sec., R.G.S. (With Illustrations by Dioptric Lantern.)

SAMPSON LOW, MARSTON & CO.'S NEW BOOKS.

TWO NEW WORKS ON CHINA.

THROUGH THE YANG-TSE GORGES; or TRADE AND TRAVEL IN WESTERN CHINA. By ARCHIBALD J. LITTLE, F.R.G.S., of Ichang. With Map. 8vo, cloth, 10s. 6d.

Trade with China—Shanghai to Ichang—Environs of Ichang—Through the Gorges—Chung-King and its Neighbourhood—Life in Szechuen—Missionaries, &c.

CHINA: its Social, Political, and Religious LIFE. By M. SIMON. Crown 8vo, cloth, 6s.

"The reader will find here one of the most closely reasoned, original, and powerful defences of the Chinese social and political system that have ever been published in Europe. . . . M. Simon has produced a book which deserves to be carefully studied."—*Nature*, Jan. 19, 1888.

OUR HUNDRED DAYS IN EUROPE.

By Dr. OLIVER WENDELL HOLMES. Large-Paper Edition, limited to 100 copies, crown 4to, cloth, 15s.

"It is hard to pick and choose out of the agreeable records which Dr. Wendell Holmes gives of his experiences, for all his pages are equally pleasant, and from the nature of the case no one event is much more important than any other."—*Times*.

RICHARD F. BURTON, K.C.M.G.: HIS EARLY, PRIVATE, AND PUBLIC LIFE. With an Account of his Travels and Explorations, gathered from more than 80 Volumes of his own Works, and other sources. By FRANCIS HITCHMAN, Author of 'The Public Life of the Earl of Beaconsfield,' &c. 2 vols., demy 8vo, cloth extra, 36s. With Illustrations.

"Mr. Hitchman has made two lusty volumes out of the public and private life, the travels and explorations of R. F. Burton, K.C.M.G. . . . There is plenty of readable stuff in the volumes."—*World*.

London: Sampson Low, Marston, Searle & Rivington, Limited, St. Dunstan's House, Fetter Lane, Fleet St., E.C.

Recent Books of Travel.

DIGGING, SQUATTING, AND PIONEERING LIFE IN THE NORTHERN TERRITORY OF SOUTH AUSTRALIA. By Mrs. DOMINIC DALY. 1 vol., demy 8vo, cloth, 12s.

"Mrs. Daly's beautifully bound volume is the latest digest of Colonial matters in the Pacific. . . . She touches upon those splendid instances of courage and devotion which all of us must remember, the heroic efforts of pioneers and squatters to penetrate into the inmost recesses of the land and claim it for their countrymen."—*Daily Telegraph*.

"The book is very pleasantly written, and some of the stories it contains are remarkably well told."—*Field*.

AUSTRAL AFRICA: LOSING IT OR RULING IT: being Incidents and Experiences in Bechuanaland, Cape Colony, and England. By JOHN MACKENZIE. 2 vols., demy 8vo, with Maps and numerous Illustrations, 32s.

"Mr. Mackenzie has a story to tell that Englishmen might well digest, namely, that of the bringing about of the British Protectorate now established over Bechuanaland and the Kalahari, which happy result we, in a great measure, owe to his personal influence and exertions. Moreover, he writes with modesty and with evident sincerity and truthfulness, and, in putting his own case forward, does not try to conceal that of the other side."—*Saturday Review*.

PEN AND PENCIL IN ASIA MINOR; or, Notes from the Levant. By WILLIAM COCHRAN, Member of the Society of Arts, the Highland and Agricultural Society, London and Edinburgh, and formerly of the Asiatic Society, London and Shanghai. Illustrated with 89 Engravings, made chiefly from Water-Colour Sketches by the Author. Demy 8vo, cloth extra, 21s.

"... partly pleasure, partly science and business."—*Xmas Bookseller*.

ON A SURF-BOUND COAST: or, Cable-LAYING IN THE AFRICAN TROPICS. By A. F. CROUCH. Crown 8vo, cloth, 7s. 6d.

"The book abounds in striking incidents and amusing anecdotes, the characters being skilfully worked in. The volume is both instructive and entertaining."—*Morning Post*.

"An entertaining diary, with incidents of his life at sea and lively sketches of eccentric characters ashore."—*Times*.

MARION & CO.'S PHOTO SUPPLY WAREHOUSE,

22 & 23, Soho Square, London, W.

PHOTOGRAPHIC SETS, ready for use, with full instructions.

FREE LESSONS to Purchasers at our Gallery in Soho Square.

THE EMPIRE SETS, of best finish and material, will stand any climate, either extremes of heat or cold. Made for Plates $6\frac{1}{2} \times 4\frac{3}{4}$, $8\frac{1}{2} \times 6\frac{1}{2}$, 10×8 , 12×10 , and 15×12 .

SMALL PORTABLE CAMERAS of the Detective kind. The Parcel, Metal Miniature, The Academy, and Warwick Brooke's.

ENLARGING APPARATUS, which will enlarge small plates taken by the small Detective Cameras up to 15 or 18 inches. These apparatuses also serve as Magic Lanterns.

BERTHON'S PORTABLE COLLAPSIBLE STUDIO and Dark Room, measuring 16 ft. \times 8 ft. \times 8 ft., weighing 1 cwt. complete, ready for travelling.

BERTHON'S COLLAPSIBLE DARK TENT. Very Light, Roomy, and Portable.

COWAN'S PHOTO DEVELOPING CABINET, complete, with Lead Sink, Tables, Traps, Dishes, Bottles, &c., &c., all complete for work.

CATALOGUES FREE ON APPLICATION.

22 and 23, SOHO SQUARE, LONDON, W.

LONDON: PRINTED BY WILLIAM CLOWES AND SONS, LIMITED, STAMFORD STREET AND CHANCERY CROSS.

Digitized by Google

Authors are alone responsible for their respective statements. In MS. communication geographical names should be written in imitation of Roman type.

*Vol. X., No. 4,
New Monthly Series.*

APRIL, 1888.

[To
PR

APR 16 1888

PROCEEDINGS

OF THE

Royal Geographical Society

AND

Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE	
JOURNEY IN THE INTERIOR OF LABRADOR, JULY TO OCTOBER, 1887. By RANDLE F. HOLME	189	GEOGRAPHICAL NOTES
LECTURES ON GEOGRAPHY, DELIVERED BEFORE THE UNIVERSITY OF CAM- BRIDGE, 1888. By General R. STRACHEY, R.E., F.R.S., President. LECTURES II. AND III.	205	REPORT OF THE EVENING MEETINGS
		OBITUARY
		PROCEEDINGS OF FOREIGN SOCIETIES
		NEW GEOGRAPHICAL PUBLICATIONS
		NEW MAPS

MAPS.

LABRADOR
A NEW (POSTPONED) MAP BELONGING TO THE MARCH No.)

LONDON: EDWARD STANFORD, 55, CHANCERY LANE.
PARIS: ANDRÉ LACROIX & CO.
VIENNA: ARTARIA & CO.
HAMBURG: L. FRIEDRICHSEN & CO.
PETERSBURG: WATKINS & CO.
MANCHESTER: JOHN HEYWOOD.
EDINBURGH: DOUGLAS & FOULIS.
DUBLIN: HODGES, FOSTER & CO.
BERLIN: D. REIMER.
LEIPZIG: F. A. BROCKHAUS.
NEW YORK: SCHUBERT & BORDOWITZ.
PHILADELPHIA: G. W. KILGUS.
MELBOURNE: G. W. KILGUS.

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR	"
KURRACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

Johnston's Cosmographic Atlas, 21s.,

IS PUBLISHED BY

W. & A. K. JOHNSTON,

Of EDINA WORKS, EASTER ROAD, EDINBURGH, and 5, WHITE HART STREET,
WARWICK LANE, LONDON, E.C.

It contains 66 large, carefully-coloured, and accurate Maps of Political, Historical, Classical, Physical, and
Scriptural Geography and Astronomical Plates, and has Complete Indexes and Explanatory Letterpress.

It is recognised as the best Guinea Atlas in the World, and many Thousands have already been sold.

Ask your Bookseller to show you a copy. Detailed Prospectus on application to the Publishers.

LUXURIANT GLOSSY HAIR

Is assured to those who discard poisonous hair restorers and dyes and cheap oils,
which produce eruptions on the scalp, and use



ROWLANDS' MACASSAR OIL,

Known for nearly 100 years as the best Preserver and Beautifier of the Hair.
It contains no lead or mineral ingredients, and can now also be had in a
GOLDEN COLOUR for fair-haired children.

Sizes, 3s. 6d., 7s., 10s. 6d. (Family bottles equal to 4 small).

Ask Chemists for ROWLANDS', and avoid cheap worthless imitations under similar names.



PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY

AND MONTHLY RECORD OF GEOGRAPHY.

A Journey in the Interior of Labrador, July to October, 1887.

By RANDLE F. HOLME.

(Read at the Evening Meeting, February 15th, 1888.)

Map, p. 260.

It is a curious fact that the part of the American Continent which is nearest to the British Isles, and on the same latitude, is of all that continent the least known. Labrador has been almost universally avoided. The reason for this is not far to seek. It is the same that explains why Newfoundland, the oldest of all British Colonies, is perhaps the least developed. Each of these countries was first sought by fishermen, who found the coast, of Labrador especially, a real "abomination of desolation." On the Labrador coast not a tree is to be seen. There is nothing there but bare rocks, and occasionally a little stunted grass. It is almost perpetual winter.

The reports of the fishermen and mariners, to whom this uninviting prospect was displayed, gave the country its character, and there has been created a false impression that the interior of the country is fairly sampled by the coast.

The Arctic current, with its icebergs and icy waters, freezes the coast, but has no effect on the inland. At a distance of not more than 12 miles from the coast there commences a luxuriant forest growth, which clothes the whole of the country, with the exception of a few spots, chiefly towards the north, called "barrens." These barrens are what we should call *moors*, and are the homes of vast herds of cariboo. The climate a few miles inland is totally different from that on the coast. A journey of 20 or 30 miles in summertime up the country from the sea is like passing from winter to summer.

Before entering upon any details of my recent journey, it will be as well to inquire to what extent Labrador is at present populated, and how far the interior has been explored.

The whole of the south and the greater part of the east coast is devoted in the summertime to the cod-fishery. For the purpose of this

No. IV.—APRIL 1888.]

P

fishery, large numbers of Newfoundlanders settle in the spring on the coast in villages, and return to Newfoundland in the autumn at the close of the fishing season. About the inlets and estuaries, and wherever any salmon are to be caught, there live a few British and Newfoundland emigrants, and a large number of Eskimos and half-breeds. These men spend the winter as well as the summer in the country, living, not in villages as the cod-fishermen do, but in scattered homesteads. Their employment consists in the summer of salmon-fishing, in the winter of trapping, and in the spring of seal-hunting. They never live far from the coast; but in the wintertime they sometimes walk considerable distances inland in search of fur. The pure Eskimos are not often found further south than Hamilton Inlet. In that inlet, however, they are numerous.

On the east coast, north of Hamilton Inlet, are several Moravian mission and trading settlements. A Church of England mission-house is now being built at Cartwright in Sandwich Harbour. The first Church of England missionary who has spent a winter so far north as Sandwich Harbour is the Rev. Frank Colley, of Newfoundland, who has spent the last three winters there. There is also a Church of England mission-house at Battle Harbour, on an island in the Straits of Belle Isle. A Dissenting minister has recently settled in Hamilton Inlet.

There are Hudson's Bay Company's posts at Mingan on the south coast; at Cartwright, Rigolet, North-west river, Davis Inlet, and Nachvak on the east coast; and at Fort Chimmo in Ungava Bay.

The interior is inhabited by a considerable number of Red Indians, whose numbers are, however, ludicrously disproportionate to the enormous size of the country.

The Indians of Labrador are all of the Cree nation, but those who frequent the north coast call themselves Nascopees, and those on the south and east, Montagnais, or Mountaineers. They spend a few weeks in the spring of each year encamping near the Company's posts, either at Mingan, North-west river, or Fort Chimmo, where they meet the priest, and trade their furs for ammunition, clothes, and provisions; but for the rest their habits are entirely nomadic. They live in wigwams covered with birch-bark or deer-hide, round which they pile the snow in wintertime. Their canoes they also make of birch-bark, and in these in summertime they slowly move about. In winter, however, they walk enormous distances over the snow, although their snow-shoes are of a clumsy round pattern and do not facilitate walking as the elegant oblong Canadian ones do. During these journeys they drag behind them hand-sledges which are frequently very heavily loaded. Their sole occupation is trapping and hunting. The provisions which they obtain at the stores they generally devour in a few weeks, trusting thereafter for sustenance solely to their guns and traps. The only thing which they try to make last is tea, for which they have acquired a

great affection since the Company ceased to trade liquor with them. There is now a heavy Government fine upon any one treating an Indian or an Eskimo to drink. They live in families; each family generally possesses a small dog trained to hunt for porcupines, which, with ptarmigan, form their most reliable means of support.

The Eskimos about Hamilton Inlet are quite civilised. Higher up on the east coast they are less so, although they have the advantage of Moravian training. In the extreme north they are chiefly pagan, and absolutely uncivilised, eating all their food raw, and living in the winter in snow houses without fires. The Eskimos never go inland.

There is mail communication from Newfoundland between July and October as far north as Nain on the east coast. The steamer also goes as far west as Bonne Espérance on the south coast. Once during the winter a mail is sent by *Cometic** and dogs over the snow from Quebec.

The south of the country is extremely well watered, and the whole interior is dotted with large lakes. The Indians are consequently acquainted with a complete system of internal navigation, joining the Seven Islands, Mingan, and the mouth of the St. Augustine river on the south coast, with North-west river on the east, and Ungava on the north.*

Only two white men, however, other than officers of the Hudson's Bay Company, have until now ever made an inland voyage, so far as I have been able to ascertain. One is Père Lacasse, the Roman Catholic missionary to the Indians, who receives the various portions of his flock at Mingan, North-west river, and Ungava. He generally proceeds to these places by sea, but on one occasion he journeyed from Mingan to North-west river by the Mingan and Kenamou rivers, and from North-west river to Ungava by the Nascopee and Waquash rivers.

The other is Professor Hind, who in 1861 journeyed up the river Moisie and back again. This was not, however, properly speaking, a journey in Labrador, but in the Canadian province of Quebec, the boundary between Labrador and Canada being Salmon river.†

Of Hudson's Bay Company officers, it is understood that Mr. Maclean in 1839 journeyed by river from Ungava to Lake Petchikapou, and on as far as the Grand Falls on the Grand (or Hamilton) river above Lake Waminikapou.

Sir Donald A. Smith, formerly a clerk in the Company's service in Labrador, once journeyed overland from Mingan to North-west river on the route subsequently followed by Père Lacasse.

But the most important point connected with the Labrador interior

* I conversed with an Indian, named Pierre Gaspé, who last spring came from Gaspé, on the south side of the Gulf of St. Lawrence, and reached North-west river by means of the St. John's, Ninipi, and Grand rivers.

† Vide 'Journal R.G.S.,' vol. xxxiv. p. 82.

is the Company's inland post, Fort Nascopee, which formerly existed on Lake Petchikapou. During the latter years when this post was used, a journey was made annually from North-west river in an inland boat up the Grand river, and through Lake Waminikapou. The men, about twenty in number, with an officer in charge, went up in the autumn with stores for their own use, and goods for trading purposes, and returned in the spring as soon as the inland navigation opened, leaving the post deserted during the summer months.

In 1864, however, this post was abandoned, and since that date the Grand river has not been navigated by a white man until last summer, when I ascended the river as far as Lake Waminikapou.

I left England on July 5th, accompanied by Mr. H. Duff, Fellow of All Souls College, Oxford, and reached St. John's, Newfoundland, on July 13th. The first Labrador mail for the year had left shortly before we arrived. After waiting six days in Newfoundland, we caught the second mail. This was a small coastal steamer, the *Plover*, belonging to a St. John's firm. After touching at numerous ports on the east and north coast of Newfoundland, and on the south coast of Labrador, going as far west as Bonne Espérance, the *Plover* left us at Battle Harbour, in the south-east corner of Labrador, on July 24th. Here we changed into the *Lady Glover* mail steamer, which had left St. John's a few days before we arrived there, and had by this time made her first trip on the Labrador coast. The field ice on the coast had prevented her on that trip from going further north than Hamilton Inlet. On her next voyage, however, she was able to proceed as far north as Nain, her extreme point.

The *Lady Glover* carries a doctor paid by the Government for the benefit of the inhabitants of the coast. In this steamer we reached Rigolet in Hamilton Inlet on July 27th.

The voyage on the Newfoundland coast was warm and most enjoyable, and the scenery in many places exquisite. In the Straits of Belle Isle, however, we encountered thick fogs. On the Labrador coast it was cold, but clear and beautiful. The coast was bleak and dreary, without any vegetation whatever, but indented with a great number of superb natural harbours. On the Labrador coast, south of Hamilton Inlet, we touched at numerous ports, which were in many cases tiny settlements of not more than three or four houses.

We were armed with a letter of introduction, kindly obtained for us by an influential friend in London, from the headquarters of the Hudson's Bay Company, without which a journey inland is scarcely practicable. Mr. Keith Mackenzie, the gentleman in charge of the post at Rigolet, received us with the utmost hospitality, and here we were fortunate enough to meet with the missionary to the Indians, Père Lacasse, of whom mention has already been made.

We started to sail up the inlet in a small schooner belonging to the

Company. Twelve miles west of Rigolet lies Eskimo Island, the scene of a traditionary battle between Indians and Eskimos, the two races having always been, and still being, hereditary foes. On this occasion the *casus belli* was as follows:—The Indians asserted that the Great Spirit had made an unmistakable sign by which to distinguish the territories of the two races; all that was covered with forest belonging to the Indians, and all that was barren being for the Eskimos; upon which issue they joined battle upon this island. This tradition is supported by my having found, when I went ashore there, about seventy Eskimo graves. These graves were made in the ordinary Eskimo custom, not being underground, although the soil was by no means deficient, but consisting of rough unhewn blocks of stone heaped together in an oblong form, the inside measurements being 2 feet by $1\frac{1}{2}$ feet. Many of them had been disturbed by bears or wolves, but in most of them a skull and bones were lying.

A sail of two days brought us to the post at North-west river, at the head of the inlet. This is a subsidiary post to that at Rigolet, which is the head post of the district. It is now the furthest inland post in Labrador, and it is here that all the Indians, except those who go to Mingan or Ungava, bring their furs to trade in springtime.

This post is in charge of Mr. Walter West, and a considerable number of families, mostly half-breed Eskimos, live scattered about the head of the bay, engaged in salmon-fishing, seal-hunting, and trapping.

Most of the Indians had unfortunately gone off into the interior about a week before our arrival, and as the salmon-fishing season was at its height we found it impossible at first to obtain any men to accompany us; we spent therefore some very enjoyable time at the post.

We afterwards obtained the services and the boat of John Montague, a "planter" at North-west river, who had emigrated from Orkney some thirteen years ago, a fine, strong man of twenty-eight years of age, well acquainted with the head of the bay. John had passed several years at Ungava, and was therefore able to give me considerable information as to the character of the country in the north.

In his company Mr. Duff and I explored all the rivers that flow into the head of the bay, ascending them in most cases as far as they are navigable. They are as follows:—

Gudder's Bight River.—A deep stream about 50 yards wide at the mouth, navigable for a small boat for four miles, or for a canoe almost as far as the Mealy Mountains, in which the river has its source.

Kenamish River.—Very similar to the Gudder's Bight river, taking its source in the Mealy Mountains.

Kenamou River.—An important river, used as one of the routes from the south. It is a wide shallow stream coming through a break in the mountain range; navigable for boats for about 10 miles, for canoes probably to its source.

Travespines River, flowing into the Grand river, five miles from its mouth. The Travespines is navigable for boats for five miles, and is a rapid, narrow stream.

We also explored the shores of Goose Bay, Rabbit Island, and Muddy Lake.

Muddy Lake is joined to the river Travespines by a small brook. Until a few years ago the water in this brook, and in Muddy Lake, was perfectly clear; but recently a landslip, or perhaps a slight earthquake, took place, and opened a mud-spring in the brook. Since then the poisonous vapour of the mud-spring has rendered the brook impassable, and the waters of the entire lake have ever since been opaque and foul.

North-west River, so called, is properly speaking not a river at all, but merely a channel some 300 yards long, joining the Big Bay to a small lake three miles long, which is at its upper end joined by a similar short channel to the Grand Lake, which is 40 miles long. Into the Grand Lake flows the river Nascopee, used as a route to the north.

The expedition during which these observations were made occupied us from August 5th to August 19th. During that time the average minimum temperature between 8 p.m. and 8 a.m. was $38\frac{1}{2}^{\circ}$ Fahrenheit, the highest being 46° , on August 17th, and the lowest 30° , on August 9th, the temperature by day ranging as high as 70° to 80° .

Upon our arrival at North-west river after this expedition, Mr. Duff was compelled to return to England.

Being anxious, however, to make a further exploration of the Grand river, which is far the largest of the rivers flowing into the bay, I re-engaged John Montague, and also obtained the services of Flet, another Orkney emigrant. Flet was past the prime of life, and rather weakly after many years of semi-starvation; but I engaged him partly because there was no one else and another hand was necessary, and partly because he had formed one of the crew of the Company's inland boat on the last two occasions that the inland post had been used, and therefore knew the river to a certain extent.

John and I left North-west river on August 22nd, and reached the mouth of Goose Bay river in the evening. This was out of our way, but we had to call there for Flet. On August 23rd we were detained at Goose Bay river by a gale.

On August 24th we left Goose Bay river and started up the Grand river. We met three families of Indians near the river mouth, and we saw no other human being until we reached the same place on our way back a month later. We spent the night in an empty log-hut at High Point, on the south side of the river. On August 25th we reached the first falls by noon, and I spent a few hours in photographing them. These falls consist of two steps, the total fall being 70 feet.

The whole of August 26th was occupied with portaging the boat and

stuff to the head of the falls. The portage path consists of a steep ascent of 210 feet, followed by about half-a-mile level through the woods, and a descent of 140 feet.

A canoe would, of course, have been more suitable for work of this kind, but as my crew consisted of white men who were less accustomed to canoes, I had been compelled to take a boat. This had also certain advantages, as we were frequently able to sail, and moreover a boat is not so dependent upon the weather as a canoe, on a large river like this. The boat we had was an ordinary fisherman's dingey with two small masts; light as such boats go, but still almost more than three men could lift.

The boat was hoisted up the bank by means of a block and tackle attached to trees, and frequently shifted, dragged across the level piece, and lowered down the other bank. Then the stuff was carried over, piece by piece. On August 27th it rained incessantly. However, we made nearly 15 miles, and camped on the north side just below Sandy Banks.

Hitherto the river had been wide, the current fairly slack, and the banks sandy, and we had rowed or sailed most of the way. On August 28th these conditions became reversed, and from this point right up to Lake Waminikapou, with the exception of Gull Island Lake and some parts of the river near to it, the journey was one long struggle with the rapid water. Flet steered, being, as has been said, not very strong, while John and I tracked along the rocky bank the entire distance. The walking was often of the most terrible description, and frequently necessitated climbing over sheer rocks or heaps of fallen timber. Sometimes the character of the bank required us to cross the stream, an operation which generally cost us nearly a quarter of a mile.

On August 29th we reached the foot of Gull Island Rapid. This is the fiercest of the rapids on this river, though not the longest. Unfortunately a great deal of rain had fallen during the previous week, and consequently we found the water so high that an ascent of the rapid was impossible. We were therefore compelled to wait for two days, August 30th and 31st, during which the river fell to the extent of nearly two feet. We were the less annoyed at this delay as Gull Island Lake proved to be full of fine whitefish, large numbers of which we caught and dried.

On September 1st we ascended, with great difficulty, the Gull Island Rapid. For this it was necessary to entirely empty the boat which, steered by one man, was then step by step hauled up the rapid. The stuff was carried along the rocky shore. We camped on the shore immediately above the rapid. For nearly 15 miles above this rapid the river runs through a gorge, the mountain ranges coming close down to the river on each side.

On September 2nd we reached the Horseshoe Rapid, the current being

very strong the whole of the way. This rapid consists of three separate parts, and caused considerable difficulty. On September 3rd we came within sight of Ninipi Rapid, the largest rapid on the river. The banks are here extremely wild and rugged, and the forest has been burnt for many miles.

There flows into the Grand river at the Ninipi Rapid a small stream called Ninipi river, which is a favourite route of Indians between Mingan and North-west river.

On September 4th we passed the Ninipi Rapid.

On September 5th the stream was slacker, and we made 13 miles. On that day I got a shot at a large black bear, which we failed, however, to secure. Bears are commonly found where the forest has been burnt down, as burnt forest ground produces quantities of berries, the favourite food of those animals.

On September 6th we made $12\frac{1}{2}$ miles, the stream being fairly slack. On September 7th the current began to be stronger again, but we succeeded in making another $12\frac{1}{2}$ miles. On September 8th it rained the greater part of the day, which made the rocks very slippery to walk on. The stream was also very strong, and we consequently only made $6\frac{1}{2}$ miles. On September 9th we passed the Mouni Rapids and reached Lake Waminikapou.

On September 10th we rowed about 20 miles up Lake Waminikapou. During the afternoon, however, a gale began to blow in our teeth, and, a heavy sea getting up, we found it impossible to proceed, and were compelled to put to shore, where we spent the night.

The expedition had thus far taken much longer than I had anticipated, partly owing to the height of the water, and partly to fallacious ideas as to the distances. The men had been quite unable to say how far it was, or how long it would take us, and I had expected to find Lake Waminikapou to be certainly less than 100 miles from the mouth of the river, whereas it is almost 150. In fact, in Professor Hind's 'Labrador,' vol. ii. p. 136, the Grand Falls of the river are said to be about 100 miles from the mouth. Now I had reliable information that these falls are 30 miles above Lake Waminikapou, and that the lake is 40 miles long. According to Professor Hind, therefore, the lake should be within 30 miles of the river-mouth.

Owing to these miscalculations our provisions were by this time running extremely short. We had for some days been on short rations, and on the night of September 10th we finished our pork. We had then nothing left but a small quantity of flour and some tea.

When, therefore, we were stopped on Lake Waminikapou by the gale, which appeared likely to last for some days, we had no option but to turn back, which we did, reaching the head of the First Falls in three days and a half. The boat and the remains of our baggage were taken over the portage path again, and that morning we ate the last remnants of our

food. We proceeded the same day as far as High Point, where we met with some Indians, who gave us porcupine and bread to eat.

The next night we encamped at Sandy Point, and on September 19th reached North-west river.

It was annoying to have to turn back when we did, as we were within 50 miles of the Grand Falls. Of this 50 miles 20 were in the still water of the lake, and it would not have been necessary to take all the baggage the other 30 miles. We might even have walked them if the river had turned out to be difficult. Indeed, we estimated that in another three or four days, had the gale abated, we should have reached the falls. But we failed to catch any fish in the lake, and there appeared to be nothing to shoot; and when, on the morning of September 11th, we found the gale blowing as strongly as ever, we considered that to proceed would mean starvation, while waiting would be little better.

The Grand Falls are said by the Labrador Indians to be haunted, and as they firmly believe that no one can look upon them and live, they are careful to avoid them. There is little doubt that only two white men have ever seen them: one is Maclean, whose expedition in 1839 was stopped by them, and the other is a Mr. Kennedy, who some thirty years ago was in charge of Fort Nascopee on Lake Petchikapou. Mr. Kennedy was guided to them by an Indian called Louis-over-the-Fire, who, being an Irroquois, does not entirely share the Labrador Indian superstitions. Louis came over from Montreal in the Company's service forty years ago, and has spent all his life since then in the Labrador interior. He was the pilot of the Company's inland boat to Nascopee during the last fifteen years that route was used. He speaks English well, and gave me considerable information with respect to the country. He is now unfortunately a cripple, or I should have engaged him as guide.

It may appear strange that during the many years the inland route to Nascopee was used, no officer of the Company, except Mr. Kennedy, should ever have been to the Grand Falls. When, however, it is noted that the route taken by the Company's men left the Grand river a short way above Lake Waminikapou and made a portage, about seven miles long, to the nearest point of the next lake, leaving the falls about 30 miles to the west, and that the men were paid by the day during the voyage, these considerations will sufficiently account for this apparent want of curiosity on the part of the officers in charge.

The height of the Grand Falls is not known, but there is little doubt that they are in certain respects the most stupendous falls in the world. The centre of Labrador, as is generally known, is a vast tableland, the limits of which are clearly defined, though of course the country intervening between this limit and the coast always consists, more or less, of a slope. Roughly speaking, it may be said that in the south and

north there is a more or less gradual slope from the height of land to the coast, while in the south-east the descent is sudden, and almost immediately after leaving the tableland there is reached a level which is but little above that of the sea. In the north-east portion the edge of the tableland approaches nearest to the coast,* while it trends considerably to the west in the rear of Hamilton Inlet. The most fertile part of the country is that which lies between the tableland and the sterile belt on the coast, though the height of land itself is by no means a desert. On the height of land there is found a succession of great lakes joined together by broad placid streams. When the streams of water reach the edge of the tableland, they of course commence a wild career down towards the sea. In the case of the Grand river this rapid descent commences with the Grand Falls, and almost the whole of the great drop to the sea-level is effected in the one waterfall.

The elevation of the Labrador tableland is given by Prof. Hind as 2240 feet. From this height the Moisie and Cold Water rivers descend to the sea by means of a considerable number of falls. But in the Grand river below Lake Waminikapou there is only one fall, viz. that which occurs 25 miles from the river-mouth. This fall is 70 feet. It is true that the whole of the river from Lake Waminikapou to the First Falls is rapid, but there is no place where there is any considerable drop, and indeed no place where it is necessary to take the boat out of the water.

Now the lake first above the Grand Falls is on the height of land. In the channels joining the various lakes above the falls there are no rapids and there is scarcely any stream.

It follows, assuming the elevation of the tableland on the east to be approximate to that on the south, that in the 30 miles beginning with the Grand Falls and ending with Lake Waminikapou, there is a drop of about 2000 feet.

Some of this drop is probably effected by the rapids immediately below the falls, but the greater part is no doubt made by the fall itself. The river is said by Maclean to be 500 yards broad above the falls, contracting to 50 yards at the falls themselves. It therefore seems probable that there is no other fall in the world of such volume of water so high, or of so great height with such volume of water.†

* My reasons for this belief are:—1. No rivers of any considerable size appear to debouch upon that portion of the coast. 2. High land is reported to be there seen near the coast.

† The greatest waterfall in the Yosemite valley is said to be 2550 feet high, but this is broken into three leaps, and, properly speaking, consists of three separate falls. The river is there said to be about 40 yards wide. This seems to be the only known fall that for the combination of height and volume can be compared to the falls on the Grand river; for, of other falls, Niagara, Zambesi, and Missouri, though of incomparably greater volume, are only 164 feet, 100 feet, and 87 feet high respectively, while none of the other falls that approach those on the Grand river in height can be compared to it in point of volume, being, in fact, little more than mountain torrents.

The map of the interior published by Prof. Hind in his book, has been generally accepted in maps since made, which are very meagre and often contradictory. The canoe route which he marks between Lake Aswanipi and Hamilton Inlet, is in its main features correct. But it is a mistake to suppose that the Grand river is the means of communication the whole way, more than half the distance consisting of the Ninipi river, which is a small tributary of the Grand river, and not more than one-eighth of its size. It is also a mistake to suppose that Lake Waminikapou, the Grand Falls, Lake Petchikapou, and the numerous intervening lakes, are on the line of communication between Lake Aswanipi and Hamilton Inlet.

Lake Petchikapou is not, as it is placed in Hind's map, on or about the same latitude as Hamilton Inlet, but just half-way between North-west river and Ungava. In most recent maps Hind's map has been departed from so far as to place this lake in its proper position.* But the logical consequence of this alteration has not been followed out; that is to say, the position of the Grand river, which flows out of that lake, has not been changed, though the position of the lake itself has been changed.† And with the Grand river; must also be shifted that string of lakes which it connects, lying between Lakes Petchikapou and Waminikapou. Consequently that string of lakes, instead of lying east and west of one another, are almost north and south, which is clearly an all-important change in the configuration of the interior.

Lake Petchikapou can be reached from North-west river by the Nascopee river, as well as by the Grand river. That route is shorter but more difficult.

It should be also noted that the usual route from the south coast to the east coast is not, as might, from Prof. Hind's map, be supposed, that *via* Lake Aswanipi, but by the Mingan and Kenamou rivers, or by the St. John's, Ninipi, and Grand rivers. The Aswanipi route would generally be only used on the way to the north.

* On what grounds the alteration has been made in recent maps I do not know. I have no doubt, however, that the change is correct, on the following grounds, apart from the assertions of Indians acquainted with the interior. Lake Petchikapou is reached from North-west river not only by the Grand river, but also by the Nascopee river on the route to the north, as followed by Père Lacasse. This precludes the possibility of its being on the latitude of Hamilton Inlet, especially as, according to the Père, the route from North-west river to Ungava is fairly direct.

† Maclean, after travelling from Ungava to Lake Petchikapou, proceeded to try and discover the route (afterwards achieved) connecting Petchikapou and Hamilton Inlet, and succeeded in getting by water as far as the Grand Falls, when he turned back. This proves that it is the Grand river which connects Lakes Petchikapou and Waminikapou. For had there been any other water route leading out of the lake next above the Grand Falls, there is no doubt that Maclean would have proceeded by it, inasmuch as he was at his wit's end to discover some means of circumventing the Grand Falls, but failed to do so, and consequently retraced his steps.

While on the subject of the map of Labrador, it may be remarked that the settlement called Southbrook, generally marked at the head of Hamilton Inlet by the mouth of the Kenamou river, may in future maps be omitted, as the sea has there largely encroached, and some years ago the last vestige of the village was obliterated.

The country between the edge of the tableland and the coast is hilly, and often mountainous, and almost entirely covered with forest, that is to say, with various species of coniferous trees, birch, and willow. Berries, especially the whortleberry and cranberry, are numerous and excellent, especially where the forest has been burnt.

In some places on the south side, about the head of the bay, the Mealy Mountains are barren, and were formerly frequented by cariboo. In order to find any quantity of these animals now, however, it is necessary to go further north.*

The most common birds are wild geese, black ducks, shell-birds, divers, loons, plover, and, near the coast, curlew.

The salmon fishery, which a few years ago was unlimited, has now almost entirely failed in Hamilton Inlet and on most of the east coast, though it still prospers in Ungava Bay. Salmon peel and trout are still sufficiently numerous in all parts. White-fish and "suckers" are also very common, the former being admirable eating, the latter very coarse.

The most plentiful mineral appears to be iron. The sand of almost all the rivers flowing into the head of the bay is black with this mineral. An attempt was recently made on the Kenamou river to turn this to account, but the scheme failed.

Labradorite, or Labrador spar, is very common about Hamilton Inlet, huge boulders of it lying about the beach. I sailed from North-west river to Rigolet in a schooner entirely ballasted with this beautiful stone.

The curse of this country in summer is the flies, that is, mosquitoes and black flies. It is probable that these pests are worse in this country than in any other. Were it not for them, the country would be most enjoyable in summertime. The summer lasts for a good three months, from the middle of June to the middle of September, during which it is like an English summer without the oppressively hot days. There are small kitchen-gardens at North-west river, Rigolet, and other places on the shores of Hamilton Inlet, which meet with very fair success. As, however, they are not able to plant till June, in which month the snow generally clears away, their season is thrown rather late. I ate new potatoes at Rigolet in September. There is one cow on the east coast,

* The following is a list of the fur commonly trapped in Labrador:—Black bear, wolf, wolverine, lynx (or mountain cat), red fox, white fox, blue fox, silver fox, otter, beaver, martin, musquash, mink.

in the south-west corner of Hamilton Inlet, and no other cattle of any kind. The reason for this is that Eskimo dogs are a necessity, and are kept in large quantities, and owing to their ferocity it is almost an impossibility to keep any other kind of animal.

In conclusion, if travellers are not deterred by the flies, which can, to a certain extent, be counteracted by mosquito nets at night, and other appliances by day, and to which, like all other troubles, man gets wonderfully inured, the Labrador interior affords great interest of natural scenery, and from the almost total absence of information and maps opens up a field of enterprise which has not hitherto been explored. New and superior steamers are being built for the coastal service from St. John's, and will begin to run this summer.

It is, however, right to add that the country affords few inducements to the sportsman, in the summer at least, either as regards shooting or fishing, as compared with many other more accessible parts of the world. Of the winter I cannot from my own experience speak; but from all I could gather, any one spending a winter in Labrador, which under the auspices of the Hudson's Bay Company would be by no means a comfortable thing to do, would find sport of an exceptionally attractive character, while he might add considerably to our geographical knowledge; for it may readily be understood that a man travelling over a frozen river behind a team of perhaps twenty dogs, will cover the ground with greater ease and speed than he who painfully hauls a boat against a rapid current.

As an agricultural or pastoral country Labrador has no prospects; and unless its mineral resources are some day turned to account, I cannot see that the country will ever be very different from what it is now.

But it is this very quality of unattractiveness to the colonist that renders the country invaluable to the student of nature or of anthropology. Labrador is a kind of Pompeii of the New World. It is there, perhaps, alone that the unadulterated Red Indian is now to be found. The country of this fortunate section of an unfortunate race has so little to offer the progressive European, that the forests and their inhabitants have been left to their primeval owners. It is true that the advent of the Hudson's Bay Company has brought them a few things to strengthen them in their warfare with nature animate and inanimate, and that the Indians have probably all been converted to Christianity, although they have retained many of their old superstitions intact. But on the east coast, and, so far as I am aware, on the south and north coasts also, no instance is known of Indians having intermixed either with whites or Eskimos, although unions between the two latter are extremely common. This interesting race is therefore, I believe, found in Labrador in a state far more primitive than in any other part of the continent of North America.

During my expedition on the Grand river I took the following meteorological notes :—

Date.	Time.	Minimum Temp. in last 12 Hours.	Present Temp. in Shade.	Aneroid.	Place.
Aug. 29..	8 a.m.	42	51	30 1	Gull I. Lake.
" 30..	"	38	45	30 2½	" "
" 31..	"	35	52	30 0½	Gull I. "
Sept. 1..	"	54	59	29 9½	" "
" 2..	"	53	59	29 7½	Head of Gull I. Rapid.
" 3..	"	..	52	29 7½	Horseshoe Rapid.
" 4..	"	34	45	29 9½	Foot of Ninipi Rapid.
" 5..	"	38	53	29 7½	Above Ninipi Rapid.
" 6..	"	49	64	29 5½	13 miles further.
" 7..	"	51	..	29 3½	12½ miles further.
" 8..	"	51	54	29 0½	12½ miles further.
" 9..	"	41	53	29 5½	6½ miles further.
" 10..	"	43	50	29 4	Lake Waminikapou, south end.
" 11..	"	38	42	29 8	Middle of ditto.
" 12..	"	35	46	29 9½	10 miles below ditto.
" 13..	"	38	42	29 8	Ninipi Rapid.
" 14..	"	39	52	29 7½	Gull I. Lake.
" 15..	"	43	..	..	Head of First Falls.
" 16..	"	41	43	30 0½	High Point.
" 17..	6 a.m.	25	28	30 2½	Sandy Point.
" 18..	8 a.m.	34	..	..	North-west River.

FURTHER ANEROID OBSERVATIONS TAKEN WHILE DESCENDING THE GRAND RIVER,
LABRADOR, FROM LAKE WAMINIKAPOU.

Date.	Time.	Distance from Lake Waminikapou in miles.	Name of Place.	Aneroid.	Probable number of feet below level of Lake Waminikapou.
Sept. 13..	4.30 p.m.	0	Foot of L. Waminikapou	29 8½	0
"	5.10 "	4	" "	29 8½	50
"	5.30 "	9	Middle of Monni Rapids	29 9	75
"	6 "	12	Foot of "	29 9½	100
Sept. 14..	8.15 a.m.	12	" "	29 9½	100
"	9 "	17	" "	29 9½	100
"	9.30 "	19½	" "	29 9½	100
"	10 "	23	" "	29 9½	100
"	10.30 "	25	" "	29 9½	100
"	11 "	27	" "	29 9½	100
"	11.30 "	28½	" "	29 9½	109
"	1.30 p.m.	"	" "	30 0	100
"	2.30 "	34	Cockatoo Island ..	29 8½	100
"	2.40 "	"	" " "	29 8	100
"	3 "	35½	Slack water ..	29 8½	125
"	3.30 "	39	" " "	29 8½	125
"	4 "	42	" " "	29 8	125
"	5 "	50	" " "	29 8	125
"	5.30 "	53	" " "	29 8	125
Sept. 15..	8.30 a.m.	53	" " "	29 8½	125
"	9.20 "	56	Head of Ninipi Rapid ..	29 8½	125
"	9.30 "	57	Foot of " " "	29 8½	150

FURTHER ANEROID OBSERVATIONS, &c.—*continued.*

Date.	Time.	Distance from Lake Waminikapou in miles.	Name of Place.	Aneroid.	Probable number of feet below level of Lake Waminikapou.
Sept. 15..	10 a.m.	68	.. ..	29 8 $\frac{1}{2}$	150
"	10.30 "	66	Head of Horseshoe Rapid	29 8 $\frac{1}{2}$	150
"	10.50 "	71	Foot of	29 8 $\frac{1}{2}$	175
"	11.30 "	75	Head of Gull I. Rapid..	29 8 $\frac{1}{2}$	175
"	1 p.m.	"	" " ..	29 8 $\frac{1}{2}$	175
"	2 "	80	Foot of " " ..	29 9	200
"	3.30 "	82	Gull I. Lake	29 9 $\frac{1}{2}$	250
Drop at first falls, 25 miles from mouth					250
Probable height of Lake Waminikapou above sea-level ..					70
					320 ft.

Below Gull Island Lake there was no perceptible drop except at the first falls.

The following discussion ensued :—

Rev. J. J. CURLING, F.R.G.S., said that part of the coast of Labrador was in his rural deanery. The clergyman in charge of the district north of Sandwich Bay and Hamilton Inlet was the Rev. F. Colley, and it was only during the last two years that that mission had been occupied during the winter; but the mission of Battle Harbour had been occupied for forty or fifty years, some very noble clergymen having spent their time there. He himself was only able to speak about the coast of Labrador. By the last census in 1884 the number of inhabitants of the coast from Blanc Sablon up to Cape Chudleigh was 4211. From Hamilton Inlet to Cape Chudleigh there were 1425, of whom only 60 were Europeans; here the Moravian missionaries had six stations. The great interest in Labrador was the summer fishery. During the summer the people went from Newfoundland in large numbers to fish there. Probably they numbered 30,000, so that when the steamers were running it was a very busy place, and every little cove in which people could settle was occupied in order to catch cod, which were shipped away to the Mediterranean and other parts. In September the fishermen returned to Newfoundland. While they were in Labrador, the clergymen went to the north and endeavoured to minister to their wants. The coast was a great contrast to the interior. It was barren and bleak, the drift ice coming down from the north preventing any vegetation, whereas inland the scenery became picturesque, with large trees, growth being very rapid in the summer months. The navigation seldom closed before Christmas, and rarely opened before the end of June. During the middle of June a steamer could force its way very often through the drift ice. The Labrador steamer left London generally towards the end of May, and went direct to Sandwich Bay. At the end of June he had himself been obliged to con a vessel through the ice in order to make the land. After exhibiting and explaining a snow-shoe he said that in the southern part dogs could not be used, as they would have to pass through woods from one bay to another. No covering was really required there. Day after day the traveller might journey in the depth of winter without anything extra to put on in the night. A little before darkness set in a spot was chosen in the woods, where, even in a gale, the wind could not penetrate. A fire was made, and the snow being three or four feet deep, the fire made a hole. For about an hour wood was cut down, and another fire was made a short distance off, which could be kept blazing throughout the night. A very comfortable night could thus be spent

below the snow, the temperature being sufficiently low to prevent the snow melting. In the interior of Newfoundland not much could be done in the way of agriculture. Those fishermen who lived on the coast and had farms got on the best, but they could not compete with Manitoba and other parts. Newfoundland was at present separated from the Dominion of Canada, having its own Governor, corresponding directly with the Imperial Government. It was quite an open question whether it would not be strengthened if it were joined to the Dominion of Canada. The country itself was rather like a very large ship, from which fish could be caught; certain minerals could be found in the interior, but directly they were taken out they were all sent away, so that although a great deal of money was made in Newfoundland the people themselves were poor, and as a rule, those who emigrated from England would find that they would do better in the central parts of Canada than in Newfoundland itself. At the same time the country had many attractions for those who had spent years there. The climate might be hard, but it was decidedly healthy, and was not all fog as some people seemed to think. Just in the Strait of Belle Isle it was foggy, and on the south coast it was foggy in the summer, but during the winter there was no fog. In the interior and on various parts of the coast the summer was beautiful. Though the salmon fishery failed last summer, yet that fishery was a very variable one, and next summer it might be good. Any gentleman going out there for sport in the months of August, September, and October, would certainly get good trout fishing, and probably good salmon fishing, especially if he had a yacht to visit different parts of the country, and if he went into the interior in the latter part of September, and came out before the end of October, he would have as good cariboo shooting as in any part of the world.

General DASHWOOD said that last summer he spent two months on the same part of the coast as Mr. Holme had visited, but he went no farther north than Sandwich Bay. All the white men there were from the south of England, and some of them lived there all the year round. One thing that struck him as a very great hardship on the old English settlers was that the Hudson's Bay Company, who had posts along the shore, laid claim to the exclusive right of killing salmon in the sea and also in the tidal portions of rivers. As far as he knew the right of fishing in the salt water was vested in the public, and the right of fishing in the tidal portion of rivers was vested in the Crown. But the Hudson's Bay Company claimed exclusive right to fish all along on many parts of the coast. They had fixed nets, and supplied the men with a certain amount of gear, and charging a rent, in the form of a portion of the fish, for the right of fishing those posts. If a man found all his gear himself, the Company took one-sixth of his catch. He himself happened to be a Justice of the Peace for Newfoundland, and he took the part of the people. He should have done so in any case. There were no members of Parliament on that coast of Labrador, and the people said if they did not do what the Company told them, their posts would be taken away. He had brought this to the notice of the Newfoundland Government, and he believed that next summer steps would be taken to put an end to it. He was armed with a letter of introduction from the Hudson's Bay Company, but did not use it. He found that every river that was not preserved by nature was more or less barred. He wrote to the agent of the Company at Sandwich Bay, calling his attention to illegal netting, especially in one river, where the netting was supplied by the Company and almost barred the stream, but the agent told the people not to mind what was said. In former days cod-fishing was carried on entirely with hook and line, with herrings, squib, or caplin for bait, but some very sharp men invented cod-traps, which ran out with wings to an enormous distance. A man in a boat who caught a fish that was too small threw it back again, but the traps did not, and the consequence was that the cod fisheries had

been very bad for the last two or three years. Another result was that the people, instead of working hard in their boats, sat with their hands in their pockets, and so became demoralised. The interior of Newfoundland was not an agricultural country. The fine agricultural land which was sometimes described was rocks and bog, and the timber scrub. The other day on board a steamer he met the special commissioner of a London newspaper, who in his account said that in the interior the land was magnificent, and that any number of fortunes could be made there; but the truth was that the land there was very inferior. It can grow potatoes, oats, and vegetables, and help a fisherman to live, but it could not compete with Manitoba as an agricultural district.

Mr. HOLME said that though Labrador might not be in a perfectly satisfactory state with the Hudson's Bay Company, it would be much worse without it. If it were not for the Company there would be *neither law nor order* in the country. It was true that a government court-house—a ship—annually went round the coast, but a court which only called in for about ten minutes in each year was not of much force. More than this, the Company took the place of Poor Guardians. There were thousands of cases in which the people would have starved if it had not been for the Hudson's Bay Company, which supplied them with food and other necessities, and kept them going without any possibility of ever being paid for what they gave.

The PRESIDENT, in proposing a vote of thanks to Mr. Holme, said that Labrador was evidently not a hospitable country, or very inviting to English travellers. The falls of the Grand River must be very stupendous if they were of anything like the magnitude that Mr. Holme had suggested. He confessed he was somewhat sceptical on that point. Judging from the aneroid observations given in the paper, he should say that Lake Waminikapou must be 700 or 800 feet above the sea, and the authority for 2240 feet as the height of the tableland was doubtful. Anything like a fall of 2000 feet was hardly conceivable.

The vote of thanks having been agreed to, the meeting adjourned.

*Lectures on Geography, delivered before the University of Cambridge,
1888.*

By General R. STRACHEY, R.E., F.R.S., President, R.G.S.

LECTURE II.

February 25th.

HAVING thus traced the growth of our knowledge of the earth's figure, of the art of navigation and the preparation of maps, I pass on to notice the parallel onward course of geographical discovery.

In many other branches of science the successive steps by which our knowledge has been advanced bear little on the ultimate results arrived at, which are complete in themselves, and constitute a body of fact having no necessary relation to the persons by whom, or to the manner in which it was collected. But geography presents itself to us in a different light. Geographical discovery, followed as it immediately was by political movements among great masses of mankind, assumes an extremely important part in the history of man; there being, indeed, no

No. IV.—APRIL 1888.]

q

country which has not been affected by the course of discovery during the last four hundred years. Had Columbus, for instance, made his famous voyages under the flag of England instead of Spain, which seems to have been at one time possible, it can hardly be doubted that the history of modern Europe would have been wholly different.

The study of geography, like that of astronomy, first took a definite shape in Greece. The earliest geographical conceptions were necessarily based on ideas of position in relation to the locality where the ancient geographers lived and wrote, and upon these the gradually increasing knowledge of the civilised world was engrafted, and developed around the eastern end of the Mediterranean Sea, where the Phenicians, the earliest of European navigators, had established the centre of their commerce, extending their voyages to the Red Sea and Persian Gulf on the east, and the coasts of Britain on the west. Herodotus, writing 450 years before the Christian era, may be taken as the exponent of the earlier forms of Greek geography. The junction of the Mediterranean with the Atlantic was then known; ideas of the North and West of Europe were vague; the form and position of the Caspian were fairly ascertained; the descriptions of India did not extend beyond the Upper Indus; and the coasts of Asia seem to have been unknown beyond the Persian Gulf. The circumnavigation of Africa was referred to, but it may be doubted whether this was more than mythical. It is a curious illustration of the result of absence of effective publication, that though Herodotus had a just general notion of the form of the Caspian, Ptolemy entirely misconceived it, and it was not recovered till within the last two hundred years.

Alexander's expedition, 330 B.C., passing through Asia Minor, Persia, and Bactria, reached the Indus, where his traces and those of his successors are still to be found, and the Greek names given to some of the great geographical features of the country he passed through, are still in use on our maps. Of the Greeks who accompanied him some went into India Proper; while Nearchus on his return followed the coast from the Indus to the Persian Gulf, and ascended the Tigris beyond Baghdad. The successors of Alexander's captains in the Bactrian kingdom which they founded extended their knowledge to Eastern India, and one of their envoys visited Palibothra, believed to be Patna, on the Lower Ganges. About the same time Carthage, originally a Phenician colony, which had become the most important maritime power in the Mediterranean, appears to have sent expeditions along the western coast of Africa, reaching perhaps to the Equator, while its ships also visited France and are said to have sailed round Britain. The trade between Egypt and the east was maintained from Berenice in the Red Sea, and other ports at the mouth of the Persian Gulf, of which Hormuz was the mediæval representative, and through them the commerce with Europe was carried on.

Up to the Augustan age, the only additions to geography were obtained through the Roman conquests in Western and Northern Europe. In the time of Pliny, the coasts of Asia had hardly been described with certainty beyond the mouths of the Ganges, and only vague conceptions of China had been formed. These ideas had become more defined, and extended to the Malay Peninsula, Sumatra, and Java, by the time of Ptolemy, A.D. 150.

Till the end of the twelfth century, the further progress of geographical, like that of all other branches of knowledge, was very inconsiderable. Something was done by the Arab geographers in the early period of the growth of Mahomedan power, and something by Norwegian Vikings whose voyages extended to Iceland, Greenland, and eventually to the coasts of North America. But in the thirteenth and following centuries, when the civilisation of Europe was becoming consolidated, the spirit of enterprise was gradually awakened.

The formation of the powerful republics of Venice and Genoa, and the spread of their commerce, under the stimulus of many causes, of which the Crusades may be reckoned as one of the most prominent, was followed by a development of maritime habits, knowledge, and enterprise among the nations bordering the Mediterranean, which was destined to produce great results.

The institution of the orders of friars, the desire to spread Christianity, and the terror produced by the incursions of Jenghiz Khan into Eastern Europe, were followed by journeys, of which one of the most remarkable was that of the monk Rubruquis, 1253 A.D., into Central Asia. The growth of commercial activity sent forth the Polos, 1265, on similar expeditions, which extended to Mongolia and China. The friar Odoric, 1320, visited Persia, Western India, Sumatra, and Java, as well as China, returning by Tibet, and being the first European to reach Lhasa. Thence he travelled by Cabul and Tabriz to Venice. His accounts are unquestionably the basis of much that is found in Sir J. Mandeville's travels, which there is much reason to think are mainly, if not wholly, fictitious.

Among the travellers of this period should also be specially mentioned Ibn Batuta, an Arab of Tangier, 1325-55, who, after visiting Egypt and Arabia, went through Persia, Afghanistan, and India, whence he was sent by Mahomad Toghlak, then king of Delhi, on an embassy to China. He travelled thither by sea down the west coast of India to the Maldives and Ceylon, and on through the Eastern Archipelago to China. His journeys are reckoned to have extended over 75,000 English miles. Thus, we are brought to the eve of that great series of voyages which are the glory of the fifteenth and sixteenth centuries, and among the most remarkable events recorded in history, opening out the way to Eastern Asia round the Cape of Good Hope, and adding in the west a new continent to the known world.

The honour of taking the initiative rests with the Portuguese. Soon after 1415, a course of maritime exploration was entered on, and continued for many years under Prince Henry, which led to the successive discoveries of Madeira, the Azores, the Cape de Verd Isles, and at length, 1484, extended along the west coast of Africa beyond the Equator. In 1486, King John sent out Diaz to endeavour to reach India by sea, the belief having become established that this could be done by passing round the continent of Africa ; but this expedition advanced little beyond the Cape of Good Hope.

Eleven years later, and two years after Columbus had returned from his first voyage, Vasco da Gama, the largest of whose ships did not exceed 120 tons burden, doubled the Cape of Good Hope, and passing along the east coast of Africa to Mozambique and Mombasa, crossed the Arabian Sea and arrived on the western coast of India, near Calicut, in 1498 A.D. Cabral in 1500, on his way to India by the same route, discovered the coast of Brazil. Many similar voyages followed, and in the course of the next few years the western and eastern coasts of Africa, and the shores of the Arabian Sea were explored ; the islands of St. Helena, Tristan da Cunha, Madagascar, Socotra, Bourbon, and Mauritius were made known ; and the Portuguese under Albuquerque had established themselves at numerous places along the coast of Arabia and India, making Goa the seat of their government. Their advance to Malacca immediately followed, and they explored Sumatra, Java, and the much coveted Spice Islands or Moluccas, their ships reaching China for the first time in 1514. Their settlements at Macao, near Canton, date from 1537. Thus in less than fifty years from the discovery of the Cape of Good Hope the Portuguese had opened out the whole of the coasts of Africa and Southern Asia as far as China, as well as a large part of the Eastern Archipelago.

Almost simultaneously, Spain, adventurers from which had already reached and occupied some of the Canary Isles, entered on a course of discovery and conquest still more remarkable. After the final triumph of Ferdinand over the Moors, the perseverance of Columbus was rewarded by the acceptance of his proposals to attempt to reach the Indies by sailing across the Atlantic, in the hope of thus finding a shorter route than that which the Portuguese were seeking round the continent of Africa.

It was in 1492 A.D. that Columbus, guided by a truly scientific course of induction, for the first time so applied by any navigator, embarked on the first of the celebrated voyages which resulted in the discovery of what were at the outset supposed to be the eastern shores of Asia ; an error largely due to mistaken reliance on Ptolemy's vastly exaggerated longitude of those shores, and on distances deduced from the itineraries of Marco Polo and other travellers. The settlements first made on the newly discovered islands, ever since known as the West Indies, were

soon extended to the neighbouring coasts of the narrow isthmus between the gulfs of Darien and Panama, and the discovery, by Nunez de Balboa, of the Pacific Ocean, followed in 1513. The accounts of this were received with an interest little less keen than that which had followed the discoveries of Columbus, indicating as it did the existence of another great ocean still intervening between the new continent found by Columbus, and Eastern Asia. The exploration of the Gulf of Mexico, and the entry of Cortez into that country in 1520, and its final conquest followed in rapid succession. In 1521 the first advances were made along the shores of the Pacific; Peru was first seen in 1526, Pizarro landed there in 1531, and the whole of that country and Chili were shortly added to the Spanish kingdom.

Meanwhile the discovery of Nunez had led to the despatch of the expedition under Magellan, a Portuguese who had sailed under Albuquerque, but had entered the service of Spain in order to undertake the new enterprise of reaching the shores of Asia by passing round the extremity of the new continent, and crossing the lately discovered Pacific Ocean. This object he successfully carried out. The Straits called after Magellan were passed in 1520, and first the Ladrone Islands and then the Philippines were discovered, where Magellan was killed in a conflict with the natives. His companions, however, continued their voyage, and passing through the Indian Archipelago, where the Portuguese had already established themselves, one of the ships, which alone survived, reached Spain again in 1522, having for the first time in the history of man accomplished the circumnavigation of the globe.

The enterprise of Spain thus completed that great work of maritime discovery in which Portugal took so honourable a share, and which in a period of less than fifty years had led to the acquisition of a knowledge of the distribution of the principal areas of land and sea in their main features.

It was soon after the commencement of this course of discovery, 1494, that an agreement was come to by Spain and Portugal, and submitted to the Pope for his sanction, for the division between the two countries of the newly discovered parts of the world. A Bull was accordingly issued by Alexander VI., which declared that a line should be drawn from pole to pole, across the globe, 100 leagues, afterwards extended to 370 leagues, west of the Azores and Cape de Verd Islands, and that all newly discovered territories to the east of this line should fall to the share of Portugal, all those to the west, to Spain. This arrangement determined the direction given to the voyages undertaken by the two countries. The line proposed is nearly on the 50th meridian west of Greenwich, and the corresponding line in the other hemisphere is on the 130th meridian east. Its adoption as a boundary served to confirm Portugal in its occupation of Brazil; but subsequently led to a conflict as to the right of Spain to the Philip-

pinus and Moluccas which lie along the 120th meridian. It is a singular circumstance that the Pope was once more referred to, only a year or two ago, to arbitrate on the occasion of a dispute with Germany as to the territorial rights of Spain over the Caroline Islands; and, if I mistake not, the Bull of Alexander was adduced as evidence in the discussion.

Before the end of the sixteenth century the exploration of the western shores of the North Atlantic as far as the polar seas had been completed by English and French sailors. The earliest English voyages of discovery are those of Cabot, believed to have been a Venetian, who had settled at Bristol in the reign of Henry VII. In 1494, when in search of a north-west passage to the Indies, he reached Newfoundland, and his sons sailed along the American coast as far south as Florida, already known through the Spaniards. Later Frobisher and Davis, 1576-1585, explored Labrador and the west coast of Greenland, and entered Baffin's Bay, so called after Baffin, who in 1616 penetrated still further, and reached lat. 78° N., but only to find the way onward blocked with ice, and impracticable.

In the latter part of the same century the Spaniards sent several expeditions from Peru across the Pacific, still seeking the Philippines and far-famed Spice Islands, and for the first time visited various groups of islands in that ocean, the Marquesas, the Society Islands, and the New Hebrides. Drake, 1577, passing through Magellan Straits, extended his explorations up the western coast of America as far as California, and for the second time accomplished the circumnavigation of the earth.

So far as the great geographical features of the globe are concerned, all that then remained to be done was to define the position and extent of the continent of Australia, and this was virtually accomplished by the Dutch in the next half century. The voyages of the Dutch into the Eastern Seas began about the year 1600, and this enterprising nation by degrees displaced the Portuguese from their possessions in the Eastern Archipelago, establishing themselves in their place, and in this position they still remain. A Dutch expedition bound for the Eastern Islands first determined, 1616, the true extremity of the South American continent by rounding Cape Horn. The northern and parts of the western coasts of Australia were explored by the Dutch in 1627, and in 1642 Tasman sailed round Australia, discovering Van Diemen's Land, now called after him, believing it to be a portion of the mainland, as well as New Zealand, thence passing on through the Fiji and Solomon groups, by New Britain and round New Guinea. In 1606 Torres, a Spanish commander, in a voyage from Peru, had already reached the north-east angle of Australia, and passing through the straits since called after him, had sailed up the south-west coast of New Guinea, thus showing that the extreme north-eastern limit of Australia had here been reached.

It is worthy of notice that all the voyages across the Pacific were directed almost along the same line, from the extremity of South America

towards New Guinea, doubtless with the object of reaching the Moluccas or Philippines, which, from a belief in the wealth there to be acquired by commerce and plunder, had become the centre of attraction of all classes of adventurers, whatever flag they flew; and to this cause may be attributed the circumstance that the geography of Australia and the northern Pacific was not made known until a much later period.

With the latter part of the seventeenth century we reach the period when a spirit of commercial enterprise had in a great degree replaced the old spirit of adventure and love of conquest, which had stimulated the earlier voyages of discovery. Concurrently with this change a great development of scientific knowledge had taken place, and expeditions, mainly for purposes of scientific discovery and investigation, began to be despatched to many distant or little known parts of the earth. Of the results of these it is only necessary to refer specifically, first, to the discovery by Behring, in 1728, of the straits separating Asia from America, through which Cook also, fifty years later, after traversing the Pacific from south to north, penetrated as far as lat. $70^{\circ} 40' N.$, when he was stopped by ice; and, second, to the fact established by the last-named great navigator, that, whatever land there may be around the South Pole does not extend beyond the Antarctic circle.

A position had now been reached in which the further progress of geography chiefly required a more exact delineation of details, and the extension into the interior of the great continents of the explorations which at first had to so considerable an extent been confined to the sea-coasts. In this labour the services of France and England were most conspicuous until the commencement of the present century. As we approach the present time, there has been a general co-operation among all civilised nations in the advancement of geographical knowledge, and the scientific value of the work done by explorers both by land and sea has become greater, as the full extent of the requirements of scientific investigation were more completely realised.

So thorough has been the success with which these labours have been prosecuted that it would now be hardly possible to describe what is known of the earth, otherwise than by pointing to what is still unknown, and this might be summarised in a very few words.

Besides the interior of Borneo and New Guinea, and the portion of Central Africa where Stanley is for the present moment lost to view, no considerable part of the earth's surface is unexplored, with the exception of the polar regions, which have till now proved inaccessible. The maps of the interior of Africa now supply trustworthy representations of a vast system of rivers, lakes, and mountains, till recently wholly unknown to the civilised world, and what remains to be done is little more than to fill in the details of well-ascertained large outlines. Australia has been crossed and recrossed in many directions. The darkness which so long enveloped Central Asia has been entirely

cleared away, and though parts of Tibet are yet to be visited, the true nature of the central plain lying between that country and Siberia is completely known. The geographical features of North America are little less perfectly mapped than those of Europe; but large parts of the interior of South America, much of which is covered by forest, are still unsurveyed. The southern border of the North Polar Sea and the very complicated system of islands and channels along the northern margin of the American continent, between Behring Strait and Greenland, have been precisely delineated, and the boundary of the same sea along Northern Asia has also been determined. The highest northern latitude reached is about $83\frac{1}{2}^{\circ}$ N., that is within 500 miles of the Pole. The nearest approach to the South Pole has been in $78^{\circ} 11' S.$, but the difficulties arising from climate have till now stood in the way of any satisfactory survey of the land seen at some few points in the Antarctic area.

I have thus far traced in broad outlines the manner in which our present knowledge of the form and magnitude of the earth, and of the features of its surface, has been acquired in the course of many centuries by the mental and physical efforts of a long succession of remarkable men, to a few only of whom was it possible that I should make special reference. The part of my subject to which I shall next ask your attention will principally regard the operation on the inorganic constituents of the globe of the great physical forces, gravity, heat, and chemical affinity, which control and determine its movements, form, and constituents, and underlie the distribution of land and sea and all the conditions of its surface.

The figure of the earth, and its existing features, have had their origin in a former state of the planet, during which it has been subject to the gradual changes that accompanied its cooling from a previously much higher temperature. The forces of nature which are still at work, including the most wonderful of all, life, have operated upon the globe while it thus passed through the stages which have led to what it now is; producing varied conditions of surface, from which have arisen as direct consequences, differences of climate, and corresponding variations in the forms and distribution of living creatures, vegetable and animal. Thus it is that while every part of the earth has its own characteristics, the general system of nature is one and the same everywhere; the special characters of the several regions being due to the action of local features or conditions, which are no sooner called into existence than they in turn become secondary efficient causes of the infinitely varied phenomena that our globe presents to us. In this manner has been evolved the face of nature as we now see it; nature, which working with never-varying forces, appears to man in the present as his type of stability, whilst it is constantly leading, through ever-varying forms, from the hidden shapes of an impenetrable past to those of an unknown future.

The influence of the movements and figure of the earth may everywhere be traced among the phenomena brought to our knowledge by the more and more complete exploration of its surface.

The daily and annual motions of the globe, subject to the effects of the spherical form of the earth and the direction of its axis of rotation, determine at all parts of its surface the amount of heat and light received from the sun, and thus regulate all the conditions of existence upon it; they give rise to the varying length of days and of seasons at different places, and to a multitude of recurring phenomena which characterise or influence the animate and inanimate world. In whatever direction we turn are to be found alternations of what may be termed terrestrial work and rest; day and night, summer and winter, periodical winds extending over longer or shorter periods, seasons of rain and dry weather. The tides of the ocean, and the less apparent, though not less regular, periodical oscillations of the atmosphere, as well as the little understood variations in terrestrial magnetism, are consequences of the same general causes. All nature, indeed, is subject to them. Under their control the ocean currents flow, the rivers rise and fall, the fields yield their harvests, the mountains are covered with snow, the florets of the daisy close and open, and the lark and nightingale pour forth their song; they regulate the migrations and hibernations of animals, the daily labours of man and beast, the hours of active life and sleep, the increase and decrease of disease and death.

Though many of the diurnal changes thus observed would equally follow as consequences of the sun moving round a stationary earth, yet it is not difficult to find direct evidence, which immediately appeals to the senses, of the rotation of the earth on its own axis. This is very completely supplied by what is known as Foucault's experiment, which is performed by means of a pendulum consisting of a somewhat heavy plummet attached to a long and slender string, which therefore has a long period of oscillation, while the direction of its motion, when swung, is not liable to disturbance by torsion of the suspending string. If such a pendulum be set in motion, with suitable precautions, over a line drawn on the earth's surface, it will be found that the direction of oscillation gradually departs from that of the line over which it commenced, the divergence being caused by the gradual change of the absolute direction of the line, consequent on the revolution of the earth on its axis—a change not communicated to the pendulum, which, being only connected with the earth by means of the flexible string, continues to swing in the same direction as that given to it when it was first set in motion. The apparent angular motion of the pendulum will be equal, but opposite in direction, to the angular motion of the earth on its axis multiplied by the sine of the latitude of the place where the pendulum is swung; which at London would give an angular velocity of 1° in about five minutes. This, with a pendulum that swung

through an arc of 10 feet, would produce an apparent displacement of about two inches in ten minutes, taking place from south, round by west, north, and east.

The movements of the atmosphere and of the currents of the ocean supply evidence of the same truth, though in a less obvious manner. The air and water everywhere, when undisturbed, acquire the velocity of rotation of the earth, which is dependent on the latitude, being greatest at the equator, and diminishing gradually towards the poles. The velocity thus acquired gives an apparent eastward impulse to all air or ocean currents moving from the equator towards the poles, and an apparent westward impulse to air and water moving the other way. This had long been recognised as the true cause of the directions of trade winds and monsoons. More recently the direction of the south-west and north-east gales that characterise our own coasts has been seen to be due to the same cause, called into operation by the passage over our islands of areas of low or high pressure, which, according as they give rise to currents of air from the south towards the north, or *vice versa*, produce winds with westerly or easterly tendencies. The revolving winds or cyclones, which are developed within the tropics in so intense a form, also carry with them a terrible testimony to the true direction of the earth's rotation on its axis from west to east.

The remarkable force inherent in the globe, known as terrestrial magnetism, which gives a determinate direction to a freely suspended magnetic needle, and is of inestimable value to man, has long been the subject of observation and study. The general properties of the magnetic needle were known and applied to navigation by European sailors early in the eleventh century, but much earlier by the Chinese. The fact that the direction of the needle deviates from the true north, such deviation being termed its variation or declination, was probably known before the time of Columbus; but to him is due the first record of the gradual change which takes place in passing from one place to another, he having observed in his voyage across the Atlantic that the variation which had at first been easterly at length became westerly. At an early period also, 1576, the dip of a properly balanced magnetic needle, or the inclination from the horizon at which it comes to rest, had been observed by Norman, an Englishman, as well as the fact that this angle also varies with geographical position.

The conception that the earth itself is a magnet, and gives the needle its direction, is due to Gilbert, also an Englishman, about 1600 A.D. Halley, who, in 1676, had visited St. Helena to make astronomical observations, and in 1698 undertook a special voyage to study terrestrial magnetism, first put forward a consistent theory of the variation of the compass. His final conclusions, based upon his own observations and all available data derived from other navigators, were published in

1701; when he showed that the complicated movements of the needle might be referred to the influence of four poles of magnetic force—two in the vicinity of either pole of the earth—a view which, with some qualifications, subsequent investigation has confirmed.

Halley's conclusions were derived from a comparatively small number of observations of the declination and dip alone, measurements of the intensity of magnetic force not having at that time been made. This force, too, is now known to vary from place to place. The more ample collection of facts relating to both intensity and direction since brought together from all parts of the earth, has led to somewhat modified views as to the phenomena of terrestrial magnetism. It is now established that there are two magnetic poles, one in each hemisphere, at which the needle would point vertically upwards and downwards. Their position, which is not coincident with the geographical poles, is found to have varied according to some yet unknown law. In the year 1878 the northern pole was in lat. 70° N., long. 96° W., and the southern in lat. $73\frac{1}{2}^{\circ}$ S., long. $147\frac{1}{2}^{\circ}$ E. Between these poles, a line that has been termed the magnetic equator, where the needle assumes a horizontal position, is found to pass round the earth, following an unsymmetrical line which, in 1878, lay almost wholly to the north of the terrestrial equator in the hemisphere east of Greenwich, and to the south of it in the western hemisphere.

It further appears that the magnetic force is not evenly distributed on the earth, and that the points of maximum intensity do not coincide with either of the magnetic poles. In the northern hemisphere there are two foci of maximum force of unequal intensity, the most powerful lying at about lat. 52° N., long. 92° W., near the great American lakes, the weaker in lat. 65° N., long. 115° E., in Siberia. For the southern hemisphere, the available data are far less numerous, and the determination of the foci of force is less reliable. It is, however, believed that here also there are two points of maximum, of nearly equal power, and not far removed from one another, one in lat. 65° S., long. 140° E., the other in lat. 50° S., long. 120° E.

The unit by which magnetic force is measured has been assumed, adopting English standards of weight and length, to be that which would impart to a weight of one grain a velocity of one foot in one second of time. On this scale the magnetic force, where least, is found to be 6.0; the northern maxima are 14.2 and 13.3 respectively, and each of the southern 15.2.

The declination, or variation of the direction of the needle from the true meridian, is a consequence of these unequal forces operating upon it, the westerly or easterly tendency of the needle (as the case may be) following the geographical position of the place of observation in its relation to the several foci of force, with a general result of considerable complexity. Up to the sixtieth parallel of latitude, north or south,

the declination, whether easterly or westerly, rarely exceeds 30° ; and, speaking generally, it is easterly in the Pacific and westerly in the Atlantic and Indian Oceans. Near the poles, where the dip becomes high, the directive force of the earth's magnetism becomes much reduced, and the magnetic needle becomes comparatively unreliable and of little use.

As what is termed the north pole of a magnetic needle or bar, attracts the south pole and repels the north pole of another needle, the magnetism of the earth at the north pole should strictly speaking be called south polar, and *vice versâ*. To avoid confusion from this cause, the north and south poles of the needle are now frequently termed the red and blue poles respectively. It may also be mentioned that magnetic declination is always measured from the true north, being described as positive when westerly, and negative when easterly.

The nature and mode of operation of magnetism, and the allied phenomena of electricity, continue to be subjects of speculation, no explanation of them having yet been proposed such as that which refers heat and light to the vibrations of an elastic medium. Our knowledge of the phenomena of terrestrial magnetism therefore still remains in the empirical stage; they are, however, held to show that the earth's magnetism is distributed through its mass, and that the magnetic force either wholly or mainly resides in the interior, and cannot be attributed to external influences, though it may be affected by them. Whether, or not, geographical features have any influence on the distribution of this force is doubtful.

Observation shows that all the elements of the earth's magnetism not only vary from place to place, but from time to time; the variations being in some cases periodical and dependent on the time of the day or the season of the year, and in others extending, with no apparent tendency to periodicity, over considerable lengths of time. The gradual alteration of the declination at London was first noticed in 1622, and the diurnal variations in 1722, in which year also the first attempt was made to measure the magnetic force. The manner in which these variations occur is still a matter of investigation, and their causes are doubtful, but the diurnal and annual changes are probably connected with changes of the temperature of the earth or its atmosphere, and may be influenced by geographical conditions. The non-periodical changes that have been recorded are very large. For instance, the declination in England, having been $11^\circ 15'$ E. in 1580, became $24^\circ 34'$ W. in 1820, and is now $18^\circ 30'$ W. The dip has changed from $71^\circ 50'$ in 1576, to $74^\circ 42'$ in 1723, and again to about $67\frac{3}{4}^\circ$ at the present time. These variations have been attributed by some to changes going on in the condition of the interior of the earth, and by others to external influences; but they continue to be among the most obscure of physical phenomena.

Besides the variations above-mentioned, there also arise other irregular

disturbances of the indications of the magnetic needle, of short duration, which are sometimes spoken of as magnetic storms. They occur with a frequency which shows a tendency to periodicity, diurnal or annual, and often almost simultaneously at distant parts of the earth, with nearly identical effects, and with a marked increase in intensity with increase of latitude. They likewise exhibit a period of increase and decrease coinciding with that observed in the sun-spot area, thus giving additional reason to connect them with modifications of the magnetic or electric condition of the earth or atmosphere arising in some manner from the action of the sun. The probable connection of these disturbances with the electrical condition of the atmosphere is indicated by their frequent occurrence simultaneously with appearances of the aurora, and with electrical earth-currents. The frequent, if not continuous, display of the aurora in the vicinity of the magnetic poles, further suggests a relation between the electrical and magnetic conditions of the earth. The true nature of all these phenomena is however, still very imperfectly ascertained.

As the phenomena most directly dependent on the form and movements of the earth became more completely known, and as the conceptions arising from their study were more clearly developed, inquiry was naturally extended to the nature of the earth's solid crust, and to the forces by the action of which its surface received its existing outlines, elevations, and depressions. The science of geology is the result; and the relation of geography to this science is what we have next to consider.

A very little observation and thought threw discredit on the ancient cosmogonies, and showed that they failed to give any satisfactory solution of the problems submitted by the advance of knowledge. If the extravagant myths of Asiatic origin, which peopled the earth millions of years ago with races of anthropomorphic demigods, and heroes descended from the sun and moon, could not bear the test of facts; neither have those traditions fared better which unveil the earth fully equipped with all the present forms of life and specially prepared to be the dwelling-place of man, some few thousand years ago. Precise observation has now supplied satisfactory proof that the earth's surface, with all that is on it, has been evolved through countless ages, by a process of constant change. Those features that at first sight appear most permanent, yet in detail undergo perpetual modification, under the operation of forces which are inherent in the materials of which the earth is made up, or are developed by its movements, and by its loss or gain of heat. Every mountain, however lofty, is being thrown down; every rock, however hard, is being worn away; and every sea, however deep, is being filled up. The destructive agencies of nature are in never-ceasing activity: the erosive

and dissolving power of water in its various forms, the disintegrating forces of heat and cold, the chemical modification of substances, the mechanical effects produced by winds and other agencies, the operation of vegetable and animal organisms, and the arts and contrivances of man, combine in the warfare against what is.

But hand-in-hand with this destruction—nay, as a part of it—there is everywhere to be found corresponding reconstruction, for untiring nature immediately builds up again that which it has just thrown down. If continents are disappearing in one direction, they are rising into fresh existence in another. Though the ocean tears down the cliffs against which it beats, the earth takes its revenge by upheaving the ocean's bed.

When we look back, by the help of geological science, to the more remote past, through the epochs preceding our own, we find complete evidence that the globe has passed in succession through an infinitude of anterior states, by means of small modifications extending over a vast period of time, but not differing in essentials from those which we now see to be going on. There are still preserved to us the remains of land and marine plants and animals—which lived, produced other generations, and died—possessed of organs proving that they were under the influence of the heat and light of the sun; indications of seas whose waves rose before the winds, breaking down cliffs, and forming beaches of boulders and pebbles; of tides and currents spreading out banks of sand and mud, on which are left the impress of the ripple of the water, of drops of rain, and of the tracks of animals; of volcanoes pouring forth streams of lava; and all these appearances are precisely similar to those we observe at the present day as the result of forces which we see actually in operation. Every successive stage, as we recede in the past history of the earth, teaches the same lesson. The forces which are now at work, whether in degrading the surface by the action of seas, rivers, or frosts, and in transporting its materials into the sea, or in reconstituting the land by the elevation of mountains, or by raising beds laid out in the depth of the ocean, or in volcanic eruptions, are traced as having continued in action from the earliest times.

Pushing back our inquiries, we at last reach the point where the apparent cessation, or failure of evidence, of former terrestrial conditions such as now exist, requires us to consider the relation in which our planet stands to other bodies in celestial space; and, vast though the gulf be that separates us from these, science has been able to bridge it. By means of spectroscopic analysis, it has been established that the constituent elements of the sun and other heavenly bodies are substantially the same as those of the earth. The examination of the meteorites which have fallen on the earth from the interplanetary spaces, shows that they contain nothing foreign to the constituents of the earth. The inference seems legitimate, corroborated as it is by the manifest physical connection between the sun and the planetary bodies circulating around it,

that the whole solar system is formed of the same kinds of matter, and is subject to the same general physical laws. These conclusions further support the supposition that the earth and other planets have been formed by the aggregation of matter once diffused in space around the sun; that the first consequence of this aggregation was to develop intense heat in the consolidating masses; that the heat thus generated in the terrestrial sphere was subsequently lost by radiation; and that the surface at length cooled and became a solid crust, enclosing a nucleus of much higher temperature.

The heat of the interior of the globe increases about 1° F. for every 50 or 60 feet of depth below the surface. The surface appears to have now reached a temperature which is virtually fixed, the gain of heat from the sun being just compensated by the loss from radiation into surrounding space. As the exterior gradually cooled, contractions necessarily ensued, producing change of form and dimensions; and to these, acting in combination with gravity, are, no doubt, largely due the greater irregularities of the earth's surface. The strains set up by these forces must have continued to cause movements for a vastly prolonged period, and are doubtless still in action.

But the irregularities of the surface constitute only a small part of the effects of internal heat on the earth, and mineralogy is the branch of science to which reference must be made, for a knowledge of the many simple and compound substances that have issued, under the operation of chemical forces, from the vast laboratory contained within the cooling crust of the once incandescent globe.

The solid nucleus of the earth, with the ocean and the atmosphere, as we now find them, may be regarded as the products which have resulted after the globe, by cooling, had attained a condition of practical equilibrium, and after the more active process of aggregation had ceased, and the combination of its elements, under the requirements of the laws of affinity, into the various solid, liquid, or gaseous matters found on or near the surface, had been completed; and it is not a little remarkable that two residual collections of matter, as I may term them, the air and the sea, which constitute a mere film on the solid earth's surface, should exercise so predominant an influence on terrestrial economy.

During the passage of the globe to its present state many wonderful changes must have taken place. The ocean, after its condensation from a gaseous state into that of liquid, must have long continued in a state of ebullition, or bordering on it, surrounded by an atmosphere densely charged with watery vapour. Apart, however, from the movements in the solid crust of the earth caused by its gradual cooling and contraction, its early higher temperature hardly enters directly into any of the considerations that arise in connection with its present climate; and it must remain doubtful how long and to what extent those conditions of climate

which interest us most, as having occurred during the period in which the existence of life is indicated, have been affected by such early higher temperature.

In the absence of any direct means of ascertaining the condition of the earth's interior, aid has been sought from mathematical science, by which it has been established, that the thickness of the solid outer shell of the earth must be considerable; and that if the interior is in a fluid state at all, which is very doubtful, it must be covered by a great thickness (probably not less than several hundred miles) of solid, comparatively unyielding matter; and it is argued, with apparent force, that no passage can exist, by which molten matter, if there be any, could ascend from such depths to the surface. Recent speculation has consequently suggested that even volcanic phenomena may be consequences of the heat developed by intense pressures set up by the mechanical forces concerned in the movements of the cooling outer solid crust, and that they are not immediate results of the very high temperature which almost certainly still subsists at great depths in the earth's interior. A more probable explanation would seem to be that by some local or partial removal of pressure in the otherwise solid interior, a portion of intensely heated matter is able to pass into the fluid state, and so finds a way through some fissure to the surface.

It is still an open question among geologists, whether the explosions accompanying volcanic eruptions are due to gases generated in the formation of the ejected melted matter, or to the sudden conversion of water into vapour in cavities containing such melted matter; the latter view being supported by the facts that great volumes of steam are discharged by volcanoes during eruptions, and that the majority of active volcanoes are on islands, or if on continents, are near the sea.

LECTURE III.

March 10th.

THE subjects of which I last spoke related to the globe viewed as a whole, and its interior. I next pass to the consideration of its exterior, with which geography is mainly concerned.

In the ocean we see the waters of the earth accumulated, after their condensation, in pre-existing depressions of the solid surface. We find almost everywhere evidences of movements of the earth's solid crust on a very large scale, and of frequent changes in the distribution of land and sea. The great continents include the areas that have last risen above the sea, and clusters of islands in many cases appear to indicate the remains of former continents now disappearing.

The gradual building up of the existing face of the earth can be

traced in the succession of deposits, often of vast thickness, collected around ancient land-surfaces; and indications are everywhere to be found of subsidences and elevations, though apparently without any altogether fundamental change in the great features or relative positions of the chief areas of land and sea, which seem to have been preserved for very long periods; so that we may not improbably still see relics of the earliest forms taken by the surface soon after it attained a solid condition. Movements such as these have continued till the latest geological times, and there is complete evidence that it was during this period that mountains among the highest in the world, the Himalaya and Alps, attained their present elevations.

Mountain ranges, which are due either to pressures arising from irregular contractions of the earth's crust, or to other internal forces capable of producing an upward thrust, occur in various forms. Frequently the areas of elevation with which mountains are associated cover very large tracts, and assume the character of tablelands or plateaus, often broken up by minor mountain ranges or elevations, which frequently follow some determinate direction. In the larger mountain masses the valleys often appear to occupy lines of rupture or fissure determined by the tensions produced by the strains that gave rise to the elevation; and attempts have been made to explain the characteristic directions observed in the elementary portions of such mountain masses, on mechanical principles. In the case of areas of elevation long as compared to their width, such as the Himalaya and Tibet, the very constant combination of long ridges and valleys with shorter intervening transverse ruptures or connections, may be thus accounted for; and it has been argued that radiating ridges and valleys accompany a roughly circular area of elevation. That valleys are very frequently caused in great part, or wholly, by erosion, due to the action of surface drainage or ocean currents, especially in unconsolidated deposits, is beyond dispute, but even in such cases their origin often appears to have been in a fault or rupture of the strata through which they pass.

The great masses of land which cover a large part of the northern hemisphere are connected around the north pole, and send out diverging offshoots towards the south; these, however, do not reach within 50 degrees of the south pole, with the exception of a small portion of South America. Generally speaking, the coasts of the continents rise steeply from great ocean depths, and very frequently high land occurs along or near their shores. In many cases the mountain-chains which bound or traverse the continents are of vast lineal extent, indicating dislocations of the solid crust of the earth which reach over very great distances and to great depths, and their frequent parallel direction suggests a probable association in the causes and time of their production. The usual distribution of volcanoes along continuous lines, extending in

many cases over thousands of miles, can hardly be explained otherwise than as being consequent on the existence of ruptures in the solid crust of the earth penetrating to very great depths. The superficial extent of many of these dislocations of the earth's crust is not less remarkable than their lineal development, and leads to similar conclusions. Such were the movements that raised the tablelands of Asia Minor, Persia, and Afghanistan, and the great desert plateau of Central Asia, and above all, the vast protuberance of Tibet, and its component gigantic mountain-chains, including the Himalaya. The high lands in both North and South America supply evidence of the same nature.

There was at first no little disinclination to accept theories which accounted for the observed facts of geology by the continued action through vast periods of time of forces now in operation. But these objections have at length disappeared, and with them the school that explained the successive steps which led to the great differences between the past and the present, by a series of catastrophes, or convulsions of nature, for which we have no authority in actual experience.

Should any still hesitate to believe that vast mountains like the Himalaya or the Andes, and analogous depressions of the bed of the ocean, can have been produced by a mere secular change of the earth's temperature, I would remind them that the forces called into action by the earth are proportionate to its magnitude, and that their effects must be on a corresponding scale. It has been calculated on sound data that the contraction of the diameter of the earth, consequent on the fall of temperature from a fluid state to its present condition, has been about 190 miles. At this rate a subsidence of five miles, which is the approximate greatest depth of the ocean, would correspond to a fall of temperature of about 200° F. But the elevations and depressions of the earth's surface were probably produced by a comparatively much smaller loss of heat, and were due rather to tangential strains than to direct upthrust or subsidence.

An illustration may assist in forming a proper estimate of the irregularities of the earth's surface, which, though apparently great, are insignificant when viewed in relation to its actual dimensions. This hall might contain a globe 40 feet in diameter. If this globe represented the earth it would be on a scale of 1 foot to about 200 miles; and 1 inch would be equivalent to a distance of $16\frac{2}{3}$ miles, or 88,000 feet. On such a globe the difference between the polar and equatorial diameters would be less than 1 inch, and the greatest elevations in Britain would be about the thickness of a threepenny-bit. The highest mountains and the deepest seas would be shown by elevations and depressions of hardly more than one-third of an inch; and if they were distributed as such features are on the earth, they would be visible only with difficulty, and to the unaided eyes of a casual observer would hardly interfere with the apparent perfect smoothness of the globe's surface.

The conception of the vast duration of geological time is one with which most persons are now more or less familiar. It is well to remember that great though the changes in human affairs have been since the most remote epochs of which there are records in monuments or history, nothing indicates that within this period there has occurred any appreciable modification of the main outlines of land and sea, or of the conditions of climate, or of the general characters of living creatures. The distance that separates us from those days is as nothing when compared to the remoteness of past geological ages. No numerical estimate on which reliance can be placed has yet been made of the duration even of that portion of geological time which is nearest to us; and we can say no more than that the earth's past history, as recorded in what we now find upon it, or as inferred from what we find, probably extends over hundreds of thousands or millions of years.

The duration of the successive ages of the earth's past existence is measured almost wholly by reference to the fossil remains of animals and plants included in the rocks of which the crust is composed. The likeness of existing forms to those that characterise each gradually receding period constantly diminishes, and the more ancient shapes which connect the present with the several stages of the past, often, by their diffusion, supply indications of the synchronism of deposits at distant places. Light is thus thrown, though it be an imperfect one, on the former distribution of land and sea, and on the existence of antecedent communications by land and sea between parts of the earth now severed, or the converse.

It is through the facts of geography as now acquired and interpreted, that the geologist is supplied with the means of arriving at the true signification of much that occurred in past time, the traces of which survive in physical features or organic forms. He finds that the most important agencies in determining and modifying the present conditions of existence on the earth, whether as affecting inorganic nature or organic beings, are closely connected with the actual distribution of land and sea, and the configuration of the surface; and he learns that it is through these agencies that he must seek to unravel the intricacies of the past.

The study of geology, in its turn, enables the geographer to understand many things that would otherwise be unintelligible to him. He thus learns how the boundaries of sea and land have been determined; where connections formerly existing have been severed; how islands have risen from the ocean and may be sinking below it; to what causes are due the rocky coasts and headlands, the indentations of the coasts, the formation of bays and fiords; at what time and by what means mountains have been raised up, plains laid out, valleys excavated, and the courses of rivers and positions of lakes fixed; and he is taught the constituents and qualities of the materials forming

the surface of the earth, of the soil upon it, and of the minerals beneath it.

And as a better insight is obtained into the natural relations of the mountains, the plains, the valleys, rivers, lakes, and seas, the conviction arises that the ever-diversified details of the face of the globe are in no sense accidents or fortuitous results, little worthy, as such, of admiration unless for their picturesque forms or wonderful proportions; but that they are the direct, orderly, and necessary outcome of the action of forces simple in themselves, and operating in accordance with well-known and invariable physical and mechanical laws. The perception of general characteristics of structure among the various features of the earth's surface, that pass under our review, is, indeed, too often overshadowed and obscured by their magnitude, by the multitude of their details, and by the variety of their forms, which at first produce impressions of hopeless confusion; but, when once the idea of subordination to common laws is duly conceived, it receives confirmation at every fresh step taken.

The area of the dry land is very greatly exceeded by that which is covered with water. The whole surface of the earth being 197 millions of square miles, about 55 millions are land, and 142 millions water. The average height of the land above the sea-level is also very much less than the average depth of the sea-bottom below that level; so that a rearrangement of the surface is quite possible by which the whole of the land might be submerged with comparatively little disturbance of the present level of the sea, or reduction of its average depth.

The highest measured peak of the Himalaya, known as Mount Everest, which is also the highest in the world accurately determined, just rises 29,000 feet above the sea-level, but such elevations even as 15,000 feet are, elsewhere, with the sole exception of parts of Tibet, confined to isolated peaks or very narrow bands along the crests of a few of the highest mountain ranges. The area above 12,000 feet is about 2 per cent. of the whole land, and that above 6000 feet less than 9 per cent. From a careful computation recently made, it would appear that the mean height of the surface of the land above the sea-level is about 2250 feet; the continental areas having the following elevations:—Europe, 939 feet; Asia, 3073 feet; North America, 1888 feet; South America, 2078 feet; Australia, 805 feet.

The greatest depths measured in the ocean exceed 27,000 feet, and it has been estimated that the mean depth is about 12,500 feet. About 5 per cent. of the ocean area is less than 600 feet in depth, and a somewhat smaller proportion, more than 18,000 feet. About 17 per cent. is less than 3000 feet. The ocean bed generally appears to present very extensive, comparatively uniform plateaus, varied only by moderate undulations, possibly to be attributed to contractions

of the earth's crust caused by cooling; these range in depth from 12,000 to 17,000 feet, and their general direction maintains a rough parallelism with that of the neighbouring continents. Submarine deposits derived from the land do not extend beyond 300 or 400 miles from the shores; but at great depths deposits are being formed with extreme slowness, which are probably derived from decomposed organisms, or from cosmic, volcanic, or other matter, carried down through the water.

Accepting these estimates, it will appear that the volume of land above the sea-level is about $\frac{1}{15}$ th part only of the volume of the ocean. This relatively very small volume of land, and comparatively uniform great depth of the sea over very large areas, when considered in connection with the evidence that exists of the continuity of the earth's history within the range of geological time, strengthens the view, based on other considerations, that the chief masses of land as we now find them have not greatly varied from their original position. Owing to the great depth of the sea, any upheaval of the sea-bottom, sufficient to form new land, would be likely to displace a volume of water greater than that of the new land, unless it were accompanied by an equivalent subsidence and increase of depth in some other locality. Failing this, such an upheaval would be followed by an encroachment of the sea on the land, which would necessarily lose an area corresponding, at all events approximately, with the volume of water displaced, and the area thus lost might easily be greater than that gained.

With the latest additions made to our knowledge of the depth of the ocean there has also been acquired an altogether new series of facts bearing on its temperature, and its capacity for supporting life. The variations of heat and cold, due to change of season or to day and night, which affect the surface, descend to a comparatively small depth, being greatly reduced in the first 100 fathoms, and below that depth for the most part eliminated, so that at 300 or 400 fathoms, an approximately uniform temperature is met with. With increased temperature at the surface, there is increased evaporation, followed by greater density, by reason of which the surface water sinks, and the higher surface temperature is partially communicated to the subjacent strata. Further, it appears that though the surface temperature of the ocean varies generally with latitude, reaching a maximum of 86° , or perhaps a few degrees higher, yet at the greatest depths, or say generally at 2000 fathoms (with an exception to be explained immediately), the water has in all latitudes a nearly constant temperature but little above the freezing-point. This is mainly due to the flow of glacial water from the Antarctic polar area towards the warmer equatorial regions, along the sea-floor, to which it sinks by reason of its greater density. The exception referred to occurs in the case of any area which is cut off by an intervening shoal from communication with the

deep glacial waters. In such cases the bottom temperature is determined by the mean winter temperature of the surface, unless the temperature of the external oceanic water at the level of the shoal be the lower of the two. Thus in the great basins of the Pacific, Indian Ocean, and Atlantic, which are of such a depth as to be in free communication with the Antarctic seas, the bottom temperature ranges from 32° F. to 36° F. In contrast with this, in the Mediterranean, which is cut off from the deep waters of the Atlantic by a shoal at a depth of about 200 fathoms, an effectual barrier is interposed to the entrance of water of a lower temperature than about 54° F.; and no lower temperature than 55° F., which corresponds to the mean winter temperature of the surface, is found even at 2000 fathoms. In the Red Sea a similar result is observed, the bottom temperature not falling below 71° F., at a depth of about 700 fathoms.

From the mobility of water, and its high specific heat, which is almost four times that of the materials composing the land-surface, the sea-surface can never acquire a very high temperature. At the same time, the evaporation which is constantly going on from the whole surface of the ocean, leads to a large quantity of the heat it receives from the sun becoming latent, and powerfully aids in preventing an accumulation of heat. These facts render the ocean one of the most important factors of terrestrial existence; it furnishes to the atmosphere the moisture which is one of the essentials of life, and serves by the circulation of its waters, and the diffusion of vapour derived from it, to equalise the temperature of the globe, by moderating the extremes both of heat and cold. Hence the greater or less proximity of the sea directly affects all conditions of climate.

The circulation of the waters of the ocean, which is set up chiefly by the action of winds on the surface, but in part by variations of temperature and of density, and by the effects of evaporation, is controlled in all its details by geographical features.

The trade-winds, which maintain over a large part of the ocean an almost constant current of air in a westward direction between the tropics, converging towards the equator, give rise to the great equatorial oceanic currents, which, impinging on the eastern shores of the continents, are deflected to the north and south along them, and tend to establish systems of circulation in the several oceanic basins, north and south of the equator, and between the east and west shores of the continents between which they lie. In the northern hemisphere the movement is from south to north and east along the eastern shores, and from north to south and west along the western shores; while in the southern the direction is the reverse, from north to south and east along the eastern shores, and from south to north and west along the western shores. These currents from or to the equator conform generally to the directions that would be imparted to them by the rotation

of the earth, and no doubt acquire additional force from this cause, particularly where the prevailing winds blow in the same direction, as they frequently do.

The most remarkable of the ocean currents is, without question, that along the east coast of North America, commonly spoken of as the Gulf-stream. It acquires great persistency from a combination of causes, which enables it to carry a very high temperature into the Arctic Circle to the north of Norway, and most powerfully to influence the climate of Western Europe, which hence offers an astonishing contrast to that of the eastern coasts of the Atlantic in the same latitudes. Thus the isotherms of sea-surface temperature, from 75° F. to 40° F., on the American coast range in the summer months between latitudes 35° and 50° N.; that is, over about 10° of latitude, or 700 miles. On the coasts of Europe and Africa the same isotherms range between 20° and 70° N., or rather beyond these limits; that is, over more than 50° of latitude, or 3500 miles. In the former case there is a change of temperature at the rate of one degree in 20 miles, in the other in 100 miles.

There are many other interesting peculiarities in the distribution of ocean temperature, to one of which I will refer. It is the occurrence of narrow tracts of relatively very cold water along certain parts of the west coasts of Africa and America, in close contiguity to areas presenting the normal temperature corresponding to the latitude. This peculiarity has been referred, with apparent reason, to the effect of the prevailing winds, which, blowing from the east, drive the surface-water away from the coasts, where it is constantly replaced by the cold water which rises from below.

How greatly local conditions of surface are able to affect the operation of the most far-reaching forces of nature is well illustrated by the tides of the ocean. The combined attraction of the sun and of the moon tends to produce a twofold tidal wave in opposite hemispheres; the crests of these travel from east to west, or in the opposite direction to that of the earth's rotation, succeeding one another at intervals of 12 hours 24 minutes, half the period of the moon's revolution round the earth, and if undisturbed would follow the apparent place of the moon, the effect of which luminary is about double that of the sun. This result is actually produced in the more open part of the ocean, chiefly in the more southern latitudes; but the distribution of the great masses of land is such that elsewhere the progress of the tidal wave in the normal direction is not possible. In the Indian Ocean and the Northern Atlantic the principal tide is propagated from south to north, and, speaking generally, in our own seas the tidal wave approaches the west and south coasts, travelling from west to east, or in a diametrically opposite direction to that of the force which generated it; while on the east coast it flows from north to south, entirely reversing the direction in which it passed

up the Atlantic. In the open sea, as observed on small islands, the rise and fall of the tide is very little, amounting to one or two feet only; but the range is in some places more than forty feet, as in the Bristol Channel, at St. Malo on the French coast, and in the Bay of Fundy. These very high tides, as well as the strong currents which in some localities accompany the flow and ebb, are secondary results due to the gradually contracting area or diminishing depth of the portion of the ocean in which the tidal wave is propagated, that wave originating in a movement of oscillation, not of translation.

The great importance, for purposes of navigation, of a knowledge of the extent and periods of the rise and fall of the tide, which vary with the distance and apparent place of the moon, has directed the attention of mathematicians to the subject, and methods have been devised by which the daily times and heights of high and low water at any port may be calculated and predicted with great precision, after a comparatively short series of observations.

It has been calculated that the forces of attraction which produce the tides of the ocean are sufficient to cause some deformation of the solid globe. The whole of the movements due to these forces being in a direction opposite to the earth's rotation, give rise to friction which leads to an extremely slow gradual reduction of the velocity of rotation. In former conditions of the earth and moon, such as there is reason to think have occurred, the changes thus produced may have been very much more rapid, and their effects may have had extremely important consequences when the globe was in a semi-fluid state. It has been suggested, in connection with speculations of this nature, that the corrugations of the cooling globe from which the existing great masses of land and the ocean beds received their original forms, may have been caused by the tide-producing forces of attraction.

The motion of the tidal wave is so greatly interfered with by the land, that the velocity of its transmission is eventually reduced to that of a free oscillating wave. This velocity, which depends on the depth of the water in which it is propagated, possibly averaging 400 or 500 miles per hour through the open seas, does not differ materially from that of the great seismic waves caused by the eruption of Krakatoa in 1883, as deduced from the numerous records obtained from various parts of the earth, including the coasts of France and England, to which the disturbances reached.

Among the influences which give to the earth the characteristics that most immediately affect its fitness for occupation by man and the support of life generally, those due to the atmosphere are, without doubt, the most prominent. These, under the designation of climate, are constantly affecting us. But of all recognised branches of science, that which treats of the atmosphere—meteorology—is at the present time

certainly the most backward. The reasons are not far to seek. The air is invisible, and in its upper regions inaccessible. The changes it undergoes are difficult to observe, and, from their great complexity, difficult to grasp, while what we know of them is almost wholly confined to the immediate proximity of the earth. It is pretty certain that the most important among the causes which operate on the atmosphere are changes of temperature; but the application of mathematical reasoning to the movements of an elastic fluid such as the air, charged with watery vapour, when submitted to changes of temperature upon a rotating sphere, presents very serious difficulties, and little has been done to grapple with them. What is known of these subjects is as yet almost exclusively empirical. Instrumental appliances are here far in advance of theories, and it is not to be disguised that great waste of labour too frequently results from an exaggerated refinement in observation, and subsequent numerical computation, which has no real value.

The air is a highly attenuated fluid medium, beneath which the whole surface of the earth is immersed, and by which all that is on the earth is surrounded, supported, and penetrated. It is the vehicle through which warmth, moisture, and the gaseous necessities of life are supplied to all living things. The variations of the temperature, of the pressure, and of the motion of the air, and of the quantity of vapour it contains, give rise to the great series of phenomena which are included under the general term climate. Of these variations the primary causes are the action and reaction of the mechanical and chemical changes set up by the sun's heat as influenced by the earth's motion, terrestrial position, and the condition of its surface, as well as by fluctuations of the sun's heat itself, though of these last we know too little to do more than recognise their presence.

The conditions which determine at any place the greater or less degree and duration of direct exposure to solar radiation, and therefore the quantity of heat received there, are position in relation to latitude, combined with the diurnal and annual movements of the earth. The nature of the surface regulates the local accumulation of heat, by reason of the varying power of absorption or radiation possessed by different substances; while with elevation above the sea-level as the density of the air becomes less, the sensible temperature and the quantity of watery vapour are subject to corresponding change. The whole of the results thus produced, moreover, are modified by movements in the air consequent on atmospheric changes from place to place, or from time to time.

All the determining causes of variation of climate just mentioned are brought into prominently contrasted action over areas of land and water. The equable sea climates on the one hand, and on the other the extreme variations of heat and cold, of drought and flood, on the great

continents, with the multitude of local results dependent on them, supply well-known illustrations of this truth.

The inequalities of the earth's surface, which are insignificant when viewed in relation to the whole globe, are of the greatest importance in relation to the atmosphere. For owing to the laws of elastic fluids, the great mass of the air and of the watery vapour it contains are concentrated very near the surface. One-fourth of the air and one-half of the vapour are found below 8000 feet from the sea-level; one-half of the air and nine-tenths of the vapour are below 19,000 feet, which hardly exceeds the average elevation of the highest ranges of the Himalaya Mountains; while three-fourths of the air and virtually the whole effective vapour lie below 30,000 feet, and therefore within the influence of the highest summits of those mountains. That portion of the atmosphere which is nearest the surface is manifestly the most likely to be acted upon by irregularities of relief, and by local variations in the power of absorbing or radiating heat or diffusing vapour. Hence it is certain that it is the movements of the lower strata of the atmosphere that chiefly affect all conditions of climate, though no doubt there are great movements in the upper regions to bring about the restoration of equilibrium, which is being constantly disturbed from below.

The principal periodical winds—such as the trade-winds, the monsoons, the land and sea breezes—are found to be essentially dependent on periodical variations of atmospheric pressure, accompanying variations of temperature due to geographical position or surface conditions. The proximate causes of the more characteristic winds of the west of Europe, and especially of our own islands, have also been well made out. These, too, are due to atmospheric disturbances producing areas of high or low pressure; the rapidity and intensity of the development of which, with the direction of their paths and their position, determine the force of the wind, the direction in which it blows, and the manner in which it veers or backs, that is, changes its direction. But how the changes of pressure are determined, and what causes the transfer of the disturbed area, commonly under the form of an atmospheric eddy or vortex, in a definite direction, usually from west to east, is still to be ascertained; though here, too, it is obvious that the distribution of the land and sea areas, and of the ocean currents, on which the temperature of the superincumbent air so immediately depends, combined with the rotatory motion of the earth, are among the principal agencies at work. The winds of our islands have commonly, more or less distinctly, the gyratory character which, as before noted, is one of the secondary results of the rotation of the earth. The precise conditions under which the great cyclones or hurricanes of the tropics are generated are still uncertain, but there is sufficient knowledge of the manner of their occurrence to show that they are disturbances set up by changes of temperature, and to enable the instructed mariner in most cases to escape their worst consequences.

With the ocean, the air performs the part of equalizing temperature, and mitigating excessive local accumulations or losses of heat; and as the ocean supplies the source of moisture, so the air distributes it, first taking it up as vapour, and then carrying it off and delivering it up, with the heat absorbed during evaporation, at distant places.

Among the most intricate problems of meteorology are those relating to the evaporation of water, the formation of vapour and its diffusion and suspension in the air, and its condensation as cloud, rain, or snow. The low specific gravity of aqueous vapour, and the constant evaporation that releases it at the earth's surface, tend to diffuse it in accordance with the mechanical laws which govern elastic fluids. But the reduction of the temperature of the air in ascending above the surface renders this diffusion impossible beyond a certain point; and observation shows that the quantity of vapour actually existing in the upper parts of the atmosphere is mainly dependent on temperature, and amounts to not more than one-fourth part of what would be present if it were diffused freely, and simply obeyed the law of hydrostatic pressure. It follows that a height in the atmosphere is at length necessarily reached where condensation must take place and clouds or rain be formed; and that, speaking generally, the vapour in the upper strata of the air is constantly tending to a condition of unstable equilibrium, from which it may readily be once more restored to the earth in the shape of water. Thus, assuming the temperature of the air at the sea-level to be 80° F., and the quantity of vapour to be 80 per cent. of what air at that temperature can hold in suspension, the free diffusion of the vapour would cause it to ascend in such quantity that condensation would take place at a height of between 3000 and 4000 feet, that being the elevation at which, the temperature of the air being about 70° F., the ascending vapour could no longer remain in suspension. Consequently clouds or rain would be formed at this elevation, and any further movement of the vapour upward would be arrested. This sufficiently accounts for the rarity of a perfectly cloudless sky, which indeed can hardly exist, excepting where such a movement of the air is going on as will carry off the aqueous vapour, as fast as it is formed by evaporation, to a region where the temperature is high enough to prevent its condensation.

The great activity of the air in discharging the function of equalising temperature and distributing moisture over the earth is remarkable. If the whole quantity of moisture in the air at any moment were condensed so as to leave it absolutely dry, the resulting stratum of water, if distributed evenly over the whole earth, would be less than one inch in depth. Yet it is estimated (though perhaps on insufficient data), that the mean rainfall over the whole globe is not less than 60 inches in the year, and falls of ten times this amount are known to occur in some localities. Observations of the velocity of the wind at marine stations show that these results are due to the almost unceasing passage of air highly charged with vapour over the regions where, and

during the time in which, rain thus falls, and to the unceasing renewal of the supply of moisture by evaporation. The relatively very large sea-area has an important effect in maintaining the supply of the rain that falls on the land; and the immediate dependence of rainfall on local geographical features is too well known to call for more than a passing remark. The presence of mountains forming a barrier in the path of the vapour-bearing winds may determine, on the one side a climate of perpetual cloud and rain, and on the other vast tracts of desert. Where no mountains exist to cause condensation such winds may pass on, leaving deserts behind them, and carry their waters to fertilise more fortunate lands beyond.

The action of the periodical winds or monsoons in bringing with them the seasons of rain in the tropical and semi-tropical regions of the earth, is of the greatest practical moment. The water-supply and the production of the ordinary food-crops are often wholly dependent on such rains; and the light thrown by science on the controlling causes of their failure or abundance may enable us to foresee the possible occurrence of drought, so as to guard against its worst consequences.

Instances of the fall of rain in excessive quantities on the windward faces of mountains exposed to winds blowing from over the sea, with relative drought to leeward, may be found in every part of the globe. In the British Isles, may be mentioned the excessive rain on the hills of Cumberland exposed to the south-west winds that blow directly up the Irish Sea and St. George's Channel. In Ireland the same facts are to be observed on every one of the clusters of hills that stand up above the otherwise low flat surface. The contrast between the fall of 73 inches at Bergen, on the coast of Norway, directly exposed to the south-west, and its reduction to one-third of that quantity at Christiania, and to one-fifth at Upsala on the continental side of the Scandinavian Peninsula, is most striking. The rainy and well-wooded eastern slopes of the Andes may be contrasted with the barren western flanks of the same chain, where it hardly ever rains; and the rainless district of Chili on a west coast, south of the equator, coinciding with the region of the south-east trade, where there is a constant current of air from the coast seaward, displays almost the exact reverse of what is observed north of the equator on parts of the west coasts of Europe and Asia, where the rain falls in torrents during the seasons when the south-west winds blow inland from over the ocean.

A few words will indicate the magnitude of the forces which are called into silent and comparatively unobserved operation in the atmosphere by the sun's heat, in the production and recondensation of aqueous vapour. It has, as I noticed, been estimated that on the average 5 feet of water falls annually as rain over the whole earth. Supposing that condensation takes place at an average height of 3000 feet above the surface, the force of evaporation must be equivalent to a power

capable of lifting 5 feet of water over the whole surface of the globe, 3000 feet during the year. This, not reckoning the force required for the transport of the rain in a horizontal direction, would involve lifting 322,000 millions of pounds of water 3000 feet in every minute, which would require about 300,000 million horse-power constantly in operation. It may assist in the apprehension of these numbers to mention that the engines of the largest ironclad do not exceed 12,000 horse-power. Of the huge energies thus exerted a very small part is transferred to the waters that run back through rivers to the sea, and a still smaller fraction is utilised by man in his water-mills; the remainder is dissipated in celestial space.

A well-known consequence of the physical properties of the air is the gradual reduction of temperature observed in ascending mountains. This, amounting to 1° for about 300 feet of elevation, gradually produces a change of conditions similar to that caused by passing from the equator towards the poles; and at the greatest elevations an arctic climate is established even under a tropical sun.

Among the sublimest sights furnished by nature are the great ranges of mountains which traverse or approach the tropics; rising into the regions of perpetual snow, they discharge important functions in the economy of the globe. By the intrusion of the solid terrestrial surface into the upper part of the atmosphere, the low temperature there, which otherwise could have produced no effect on the earth, is brought into active operation; great rivers spring from the melting fields of snow and ice that crown the mountain summits, and swollen by the copious condensation of rain on their slopes, flow down to the plains below, which are fertilised by their perennial waters.

Ice, whether in the shape of glaciers excavating their mountain beds, or as the floating fragments of glaciers which, forming icebergs, tear up the floor of the ocean, or when by expanding in the fissures of rocks it rends them asunder, is one of the most energetic of destructive agents. The recurrence in the earth's past history of glacial epochs alternating with epochs of greater heat, of which geology supplies evidence, is of much interest, and has given rise to much speculation. Among possible causes of this are to be reckoned the variations which in the lapse of time take place in the ellipticity of the earth's orbit, combined with changes of the position of the axis due to precession. At a period of maximum ellipticity, the quantities of heat received by the earth, at its least and greatest distances from the sun respectively, must be increased and diminished accordingly; and should it happen that at such a time the change in the direction of the earth's axis caused by precession, brought either hemisphere to face the sun fully when nearest to the earth, very considerable effects on the summer and winter temperatures of the two hemispheres must be produced, without affecting the mean temperature of the globe; in the more directly exposed hemisphere the

summer would be shorter and hotter, and the winter longer and colder, while in the other hemisphere there would be a milder and shorter winter, and a longer but colder summer. Displacements of the earth's axis of rotation have also been suggested as a means of accounting for some of the great local changes of temperature indicated by geology; but the evidences of such displacements hardly amount to more than arguments, based on mathematical reasoning, which show that they are not incompatible with established facts.

GEOGRAPHICAL NOTES.

Result of the first year's Examination for the Scholarships and Prizes offered by the Society to Students in Training Colleges.—The Education Department have communicated to us the names of the students who have most distinguished themselves in geography at the examinations last December, and to whom the Examiners have awarded the Society's prizes:—Male Candidates: Scholarship (15*l.*): J. W. Goodyere, Borough Road College; Prizes (Books): Fredk. Baker, Cheltenham College; H. Grover, Battersea College, and J. E. Quaife, Borough Road College (equal); A. J. Berry, Battersea College.—Female Candidates: Scholarship (15*l.*): A. E. Alexander, Whitelands College; Prizes (Books): A. Eve, Bishop Stortford College; K. Charlton, Lincoln College; Isabella Jones, Warrington College; Gertrude Martin, Chichester College.—The prizes will be presented at the Anniversary Meeting of the Society, May 28.

Connection of the Mobangi with the Welle-Makua.—It is reported from Brussels that the interesting problem of the outcome of the Welle—the fine river discovered by Schweinfurth in the Niam Niam country—has at length been solved by the persevering Belgian explorer Captain Van Gele.* He has found it to be continuous with the Mobangi, and therefore a tributary of the Congo. Details of the journey, and especially information regarding the navigability of the river, which leads from the great Atlantic Congo into the heart of Africa and the best parts of the Soudan, will be anxiously looked for.

Physical Geography of the Congo.—M. Édouard Dupont, Director of the Brussels Natural History Museum, has just returned from a visit of several months to the Congo, during which he examined the banks of the river as far as the mouth of the Kassai. In a lecture to the Belgian Society of Engineers he has given some of the results of his examination. He believes he has found the key to the process by which the Congo has been able to reach the ocean across the barrier of mountains which separate its upper course from the coast. The interior waters of equa-

* For Captain Van Gele's first exploration of the Mobangi *vide* 'Proceedings R.G.S.,' 1887, p. 440.

torial Africa, he states, owing to excess of rainfall over evaporation, accumulated in a great lake, of which Stanley Pool is all that remains. They slowly ascended on the eastern face of the mountain barrier, until having reached the summit of the crest, they overflowed, and were precipitated towards the Atlantic in torrents, the force of which sufficed to excavate the deep gorge through which, in the region of the cataracts, the river still rushes with fury.

Agriculture and Colonisation in the Provinces of Semirechinsk and Kars.—A Report by Sir R. Morier, British Ambassador at St. Petersburg, which has been recently published by the Foreign Office (Miscellaneous Series No. 88), contains abstracts of two interesting appendices published at the end of the "General Report of the Russian Department of Agriculture for 1886," which give particulars of the economical conditions of the Provinces of Semirechinsk and Kars under Russian rule, and of Russian colonisation among the Asiatic races. The report upon the former province is drawn up by M. Krasnoff. The Russian colonists in this district may be divided into two classes, viz. the Semirechinsk Cossacks and the peasant settlers; the latter are usually either Siberians or colonists who have lived some time in Siberia, and have been driven southwards by the cold and bad harvests of Siberia. M. Krasnoff comments upon the instability of the Russian settlers, and on the hasty, aimless emigration and immigration which appears to be everywhere going on. Side by side with the Russian colonisation he notices with regret the constant immigration of large numbers of non-Russian settlers, chiefly Dungans and Taranchis, who offer a serious hindrance to the rapid Russification of the country. Thus only the central portion of the district of Vernie, the most important in Semirechinsk, is really Russian; the country to the east especially has a purely Asiatic appearance, the plains being dotted over with Taranchi villages, with narrow, dirty, irregular streets and mud huts devoid of windows. Although the report gives no statistics as to the population, it appears from the most recent Russian publications that in 1885 the total population of the province was 758,258. Of these 595,000 were Kirghizes (the original inhabitants), 3000 Tartars, about 20,000 Dungans, 35,000 Taranchis, and 44,600 Russians including Cossacks; the remainder comprised Jews, Sarts, and miscellaneous native races. Since 1885 the population has risen to 815,000.—In dealing with the agriculture of the province, M. Krasnoff divides the province into five agricultural zones:—(1) The "chestnut soil" of the Ili valley, which resembles that of South-eastern Russia, and is interspersed here and there with stretches of "clayey-saline" soil, overgrown with scrub or brushwood. (2) The sandy region of the Ili valley. (3) A swamp district with the flora of the marshes of South-eastern Russia. (4) The slopes of the Alatay range, where the soil is a poor black earth, and the vegetation something between that of Russian "black land" and the steppe. (5) The vicinity of Lake

Issik Kul, with a sandy-clayey soil and a flora partly like that of the "black land" and partly marshy in its character. Land of this last kind can alone produce corn without the aid of irrigation; almost everywhere else the peasants have recourse to "aryks" (descending canals) for the purposes of irrigation. Vineyards are found on the southern slopes of the Alatau near Djargent, and in the swampy district which forms the third of the above-mentioned zones. Besides corn, the people, whether Russian, Dungan, or Taranchi, grow oats, barley, flax, clover, and opium. Rye-fields are frequent in the Russian, but rarer in the native villages. Peas are grown principally by the Russians, but *kounak* (*Panicum italicum*), rice, and Kuldja millet are almost exclusively cultivated by the Taranchis. The Russian colonists, and especially the Cossacks, are great gardeners. Orchards are more general here than in the regions further north, and the contrast between the thickly wooded provinces of Central Russia and the bare steppe is less abrupt. This remark would appear to apply to the whole of Eastern Russian Turkistan. The neighbourhood of Tashkend and the district of Zarafshan between Bokhara and Samarcand resemble, according to M. Krasnoff, thickly timbered parks. —The report on the province of Kars is drawn up by Prince Masalsky, and deals only with the districts of Olti and Kagizman on the Asiatic frontier. Since the acquisition of these districts by Russia, there have been continual emigrations of Molokani from the Caucasus, and lately of Little Russians; the numbers are not given, but the Russian emigrants are stated to be in a far from prosperous condition, owing to their inability to acclimatise themselves. The dominant race in the district of Olti is Turkish (12,000 persons), and in Kagizman, Armenian (11,486 persons). There are also settlements of Yezidis, Kurds, Greeks, Turkomans, and Circassians. Most of this motley population is occupied with agriculture or gardening, but the Kurds prefer pasturage, which is also the chief employment of the Turkomans in Olti, where arable land is not abundant. The chief cereals of the Kars district are wheat, barley, rye, maize, flax, millet, and there is a limited quantity of rice grown in the valleys. Wheat can be grown up to an altitude of 7500 feet, barley up to 8000 feet. The best wheat comes from the heights of Bash-kei (near Torab-khana and the river Araxes), from the plateau of Kars, and the southern and western portions of the Olti district. In 1883 the district of Kagizman produced 274,502 poods (4412 tons) of wheat, and in 1885, 589,168 poods (9468 tons), showing an increase of more than 100 per cent. In the valley of the Olti-chai a little cotton is grown, and the castor-oil plant is cultivated with great success. The backward condition of agriculture is stated to be due to the extremely primitive methods of cultivation practised, and to the great damage done by frost and hail; indeed the productive powers of the country have not yet been properly tested. The author of the report makes the somewhat remarkable admission that the province has by no means prospered

since its annexation by Russia, and that large numbers of the Mahomedan inhabitants, particularly the sheep-owners (Kurds and Turkomans), have removed into Turkish territory.

Commercial Resources of the Nyassa Region (Central Africa).—In his Report (No. 230), for the year 1886, on the trade of the Nyassa Territories, Mr. A. G. S. Hawes, our Consul on Lake Nyassa, makes some useful observations on the commercial outlook of this district. The Report, which he states has been delayed owing to the difficulty in obtaining reliable information on the resources of the region, deals principally with the future prospects of the country, as the present trade is very limited. The imports do not amount to the ordinary business of one company, and the exports are comparatively insignificant. The export of ivory for the year 1886 amounted to about 22,000 lbs. Most of this finds its way to the coast, either through the hands of Arabs or by direct exportation on the part of the chiefs. In order to divert some of this trade into European markets, Mr. Hawes is of opinion that Europeans must deal in fire-arms as long as the natives from the coast do so. He suggests, however, that great discrimination should be exercised in the importation of ammunition. The diversion of any part of the trade will not be accomplished without difficulty, as the Arab dealers are keenly alive to their own interests and offer great inducements to the chiefs by the sale of spirituous liquors and the purchase of slaves. Mr. Hawes regards the sale of spirits to the natives as the real cause of danger to settlers in these territories. Besides ivory and oil-seeds, the exports are small and at present unprofitable. Oil-seeds grow freely in the lowlands of the Makololo country, and with low freights and well-organised communication on the river would probably become a well-paying export. Cotton grows principally in the lower valley of the Shiré, the soil of the highlands being apparently too clayey and ferruginous for its cultivation. It is nowhere grown in sufficient quantity to export, and nothing definite is known as to its quality. Among the natural products of the Nyassa territories the Report mentions rubber, indigo, strophanthus and fibre plants, as offering a possible means of trade. The first-named is now only found in small quantities; this is stated to be due to the destructive method employed by the natives in extracting the juice. The cultivation of rubber by Europeans is beginning to attract attention. Indigo grows wild all along the slopes of Mount Zomba; it forms a large bush and is perennial. Considering its luxuriant growth, its cultivation might, according to Mr. Hawes, be undertaken with advantage. Strophanthus is a climbing plant, from the seeds or fruit of which a strong poison is extracted. During 1886, 1100 lbs. were exported from these districts, and realised in the London market 9s. per lb. Mr. Hawes gives some interesting details as to the growth of this plant, which is comparatively little known in Europe. Fibre is chiefly used by the natives, and must be

No. IV.—APRIL 1888.] s

regarded at present as a doubtful export. With regard to coffee culture, the results of two years' experiments have not realised the expectations of the planters. The quality is, however, undeniable, but more experience is required before its cultivation can be pronounced successful. In this, as in all other directions, the great difficulty is the lack of native labour. Sugar-cane grows well in the Zomba district, and is rich in saccharine matter. A few tea plants have been introduced and appear to thrive fairly, but nothing definite can be said with regard to the prospects of tea plantations. Cinchona has also been introduced and is stated to show every prospect of success; the three years' old plants are now six feet high.

Recent Danish Explorations in Greenland.—Under this title Herr H. Rink contributes to the current number of Petermann's 'Mitteilungen,' an account of the results of the recent journeys made by Lieutenants Ryder and Bloch, of the Danish navy, along the coast of Greenland north of Upernivik. The two travellers passed the winter of 1886-7 in Upernivik, in order to be on the spot and thus be able to start as soon as the season should permit. The winter was of exceptional severity, and a disease caused much destruction among the dogs. On this account the travellers were obliged to start earlier than they intended, as the only available dogs for the sledges would be required by the Greenlanders for their seal-fishery in the months of April and May. A start northwards was consequently made on 25th February from Tasiusak. The cold was intense, the thermometer standing at -49° Fahr., and in the excursions further north the mercury never once thawed; even the natives suffered from the cold. The party did not get so far north as expected, in consequence of the deep snow and the failure of the food-supply for the dogs. A return was therefore made to Upernivik in March. The month of April was spent in a thorough exploration of the great ice-fjord of Audpadlartok to the east of the colony. On the 7th May, or from three to four weeks later than usual, the first stretch of open water was visible on the western horizon, and it was not until the 11th June that a ship was able to make its way to the colony. On the 26th of that month the expedition set out northwards in two boats, and notwithstanding continual battling with the ice, had succeeded by the beginning of August in surveying the coast up to $74\frac{1}{2}^{\circ}$. The last camping-place was at $74^{\circ} 25'$. From a summit (1800 feet) in the vicinity of this point the travellers managed to get a clear view over many miles; the sea away to the north and north-west was still covered with the firm winter ice. As the homeward-bound ship was to start from Upernivik on the 15th August, the party had to make a hurried return. They eventually arrived in Copenhagen in September last. An excellent map of the coast from $71^{\circ} 40'$ to $74^{\circ} 45'$ has been prepared from the surveys made by the expedition. The northern part of this stretch of coast is not deeply indented, but abounds in open bays more or

less studded with islands. The extreme northerly points reached by the natives of Upernivik in hunting are Wilcox Head and the Devil's Thumb ($74^{\circ} 15'$). Formerly these regions were comparatively well populated, as the ruins of houses, &c., testify; now the most northern habitations are at Ilivdlarsuk ($73^{\circ} 30'$). All along this stretch of coast the inland ice juts out at numerous points into the sea, and the movements of these glacier-arms were carefully studied. By accurate measurements made in the ice-fjords of Augpadlar Fok, &c., both in April and August, some interesting and important results have been secured as regards the physical geography of this region. Some of the ice-fjords are very prolific in icebergs, notably that of Giesecke, where the edge of the permanent ice has retreated considerably within recent years. The results show not only the extraordinary rapidity, but the great variableness in the movements of the ice, apart apparently from the temperature of the time of year. The average temperature of the air during the measurements from 20th to 24th April, was from -9° F. to -15° . On 28th January the water temperature, at a point where the ice-fjord was 512 fathoms in depth, was as follows:—at the surface $27^{\circ} \cdot 7$ F., at 50 fathoms $28^{\circ} \cdot 9$, at 200 fathoms 32° , and at 287 fathoms $32^{\circ} \cdot 2$. The question of the limit and movements of the inland ice of Greenland, to which the attention of recent Danish explorations has been directed, and towards the solution of which the results obtained by Lieuts. Ryder and Bloch have materially contributed, is discussed by Herr Rink in his paper, which also gives some interesting notes on the botany, geology, and ethnography of the country.

A Journey into the Highlands of San Domingo.—A short excursion into the almost unknown interior of San Domingo was made last summer by Baron H. Eggers, in the course of which he explored the mountainous district and made a complete study of the vegetation of this elevated region; he further discovered a route along which the exploration of this little-known mountain region may be carried out with facility. The following details are taken from the traveller's own account of his journey, published in Petermann's 'Mitteilungen' (1888, Part 2). He left Puerto Plata, on the north coast, on 2nd May last, and about the middle of the same month found himself at Jarabacoa on the Rio Yagui, having passed through Santiago on his way. While at Jarabacoa he ascended Monte Barrero (4100 feet), in the vicinity of the town. The steep slopes of this peak are covered with lofty pine woods. In the small ravines and between rocks, the traveller observed many interesting plants, e. g. the dark-red *Fuchsia triphylla*, a bright red *Siphocampylus*, a large *Pentstemon*, and a beautiful *Cyathea*; he also found a large number of hitherto unnoticed plants, including an illex, several Compositæ, Labiatæ, &c. The animal life in these pine forests appears to be very poor; there are scarcely any insects, and a species of crow was the only bird seen. At the end of May, the traveller, with a small party of blacks,

set out in a due southerly direction for the valley of Constanza. The way lay over the shoulder of Monte Barrero, and then in winding curves along the higher mountain ridges, which are everywhere covered with pines. After some miles, a gentle descent led down to the Rio Jimenoa, which cuts the range at a height of 3900 feet above the sea-level, and which, in its comparatively short course to the Rio Yagui below Jarabacoa, has a fall of no less than 2200 feet. The banks of this clear and swiftly flowing river are clothed with leafy woods. From the valley of the Jimenoa the party ascended again and crossed the summits of La Cumbre and Rancho Quemado, each of which has an altitude of 4725 feet. Soon after leaving the latter, the route descends to the valley of the Rio Tiro, an affluent of the Yuna. Having crossed this river, which at this time was very full of water, the traveller reached at length the savanna which, surrounded on the north, south, and west by pine-clothed mountains, is known as the Valle de Constanza. The valley is well watered, and its height above the sea is 3840 feet. Its inhabitants, numbering 100, are engaged in cattle-rearing, and the cultivation of beans, maize, cassava, tobacco, &c. The climate is cool, and from November to March dry; during the rest of the year it rains. The thermometer at six o'clock in the morning of 28th May stood at 59° Fahr. The higher parts of the surrounding mountains, which almost everywhere contain gold, though in small quantities, are quite unexplored. From the Valle de Constanza the traveller made a further excursion to the south-east to a savanna region, situated in a depression among the mountains and called by the natives the "Valle Nuevo." The path led over forest-clad mountains with intervening gorges, and formed a continual ascent till the Valle Nuevo was reached, which is 7450 feet above the sea. The distance in a straight line from the Valle de Constanza is about 16 miles. One of the forest tracts which the traveller traversed was especially dense and almost impassable; beautiful mosses, ferns, orchids, lycopods, and other epiphytes were growing on the trees. The Valle Nuevo is surrounded by low hills which form the culminating points of the range; the highest of these, viz. Pico del Valle Nuevo (8630 feet above the sea-level) was ascended by the traveller. From this point a grand panoramic view over a large portion of the island was obtained. The summit of Lomas Ruillas or Pico del Yaqui appeared to be a little higher than the Pico del Valle Nuevo, and its altitude of 9500 feet given by Schomburgk and Gabb would consequently appear to be confirmed. A night was passed in the valley in a disused "rancho"; the temperature was very cool during the night, and at 6 a.m. stood at 52° Fahr. After some hours spent in exploring the vicinity and collecting botanical specimens, the traveller returned to the valley of Constanza.

A Projected Journey across Greenland.—It is announced that an attempt is about to be made to cross Greenland, from east to west, by

M. Nansen, a Norwegian. M. Nansen will perform the journey on "skidor" or snow skates, and he will be accompanied by two or three Norwegians or Laplanders. A start is to be made from Cape Dan, on the east coast, about 66° N. lat. The general direction will be W.N.W. in order to reach the west coast in the vicinity of Disko Bay. It is calculated that the total distance of 170 miles will be covered in seventeen days. Although many attempts have been made by travellers of various nationalities to cross Greenland, no one has yet succeeded in doing so. M. Nansen is one of the most distinguished scientific men in Norway, and we may therefore look for some interesting and valuable information as to the unknown interior. The cost of the expedition will be entirely defrayed by M. Augustin Gamel, a merchant of Copenhagen, who is interested in the exploration of the polar regions.

German New Guinea.—Another voyage has been made by Dr. Schrader up the Empress Augusta river, with the result of confirming the opinion formed on the previous occasion as to the important character of this waterway and the facilities it affords for opening up the interior. The *Samoa*, in which the journey was accomplished, started on the 29th June, 1887, and after steaming up the river for eight days, reached the furthest point in $141^{\circ} 50'$ E. long., and $4^{\circ} 13'$ S. lat. The distance covered was 380 miles. It would thus appear that the *Samoa* advanced 156 miles beyond the point reached by the *Ottilie* in 1886,* and penetrated a few miles further than the latter's steam-launch. From this voyage it may be supposed that the head-waters of the river are situated within the Dutch portion of New Guinea, as the steamer got within a few miles of the boundary line (140° E. long.) between the two protectorates. As regards the navigability of the river we learn that during the rainy season sea-going vessels can proceed for a considerable distance up stream, while to river-steamers, not only the main river, but several of its affluents are navigable for a long distance. The voyage of the *Ottilie* was made during the dry season, whereas that of the *Samoa* was effected in the rainy season. An accurate survey was made of the course of the river. The New Guinea Company has also made several excursions along the coast and explorations up some of the smaller watercourses.

The Locks on the Panama Canal.—In M. de Lesseps' Annual Report on the Panama Canal, recently issued, he states that it will be impossible to complete the canal on its original plan as a level cutting in reasonable time, and that it will be necessary to make a temporary canal with locks. This will be begun next September. The canal, beginning at the Bay of Limon, has been excavated at sea-level to a distance of 14 miles. The slope of the ground then encountered is to be surmounted by five locks, the first being placed where the level

* 'R. G. S. Proceedings,' 1887, p. 120.

cutting ends. Two of these will be 26 feet high, and three of them 36 feet high to the upper reach. For the Pacific side four locks of 36 feet and one of 26 feet fall will be required to descend from a height altogether of 167 feet, the difference between the upper reach and the level of the lowest tides. The breadth of each lock will be 59 feet, and they will all have a length of 590 feet.

REPORT OF THE EVENING MEETINGS, SESSION 1887-8.

Seventh Meeting, 27th February, 1888.—General R. STRACHEY, R.E., F.R.S., President, in the Chair.

ELECTIONS.—*John George Bartholomew, Esq.; Henry F. Dale, Esq.; Louis G. Letord, Esq.; General Sir William Lockhart, K.C.B.; Lieut. George Massey, B.N.R.; John Henry Master, Esq.; Captain A. F. Mockler-Ferryman (43rd Light Infantry); James C. Semple, Esq.; Rev. Alexander B. Spaight, B.A.*

The paper read was :—

“On the District of the Ruby Mines of Burma.” By Robert Gordon, Esq., C.E. Will be published, with the author's map, in the next number of the ‘Proceedings.’

Eighth Meeting, 12th March, 1888.—General R. STRACHEY, R.E., F.R.S., President, in the Chair.

PRESENTATIONS.—*General T. E. Gordon, C.B.; J. F. Ingram, Esq.*

ELECTIONS.—*Lawrence Arthur Adamson, Esq.; Arthur Clyne, Esq.; Albert Edwin Griffiths, Esq.; Gerald Loder, Esq., B.A.; Rev. Albert Loewy; William M. Muir, Esq.*

The paper read was :—

“The Peaks, Passes, and Glaciers of the Caucasus.” By D. W. Freshfield, Esq. Will be published, with map, in a subsequent number of the ‘Proceedings.’

Obituary.

Vice-Admiral Thomas A. B. Spratt, C.B., F.R.S.*—The subject of this notice was the eldest son of the late Commander James Spratt, an officer who greatly distinguished himself at the battle of Trafalgar while serving on board H.M.S. *Defiance*.

He was born in the year 1811, and entered the Royal Navy in 1827. He commenced his career in the surveying branch of the profession, and received his early training in the Mediterranean under Captain Thomas Graves, in H.M. ships *Mastiff* and *Beacon*. He continued to serve in the latter vessel until his promotion to the rank of Lieutenant in 1841, when he was re-appointed to the survey in that capacity. From March 1847 until April 1848, as a lieutenant, he commanded the *Volage*,

* By Admiral Sir G. H. Richards, K.C.B., F.R.S.

employed on surveying service, and shortly afterwards, as commander, he succeeded Captain Graves in command of the *Spitfire*, which had taken the place of the *Volage* as the principal surveying vessel on the Mediterranean station.

When war broke out with Russia in 1854, the *Spitfire* was attached to the fleet, and Commander Spratt was actively employed on her until its close. He was present at the bombardment of Sebastopol, and subsequently planned the attacks for the capture of Kertch and Kinburn. He led the ships of the English and French fleets to their positions at the attack and capture of the latter place, and repeatedly received the acknowledgments of Sir Edmund Lyons, the Commander-in-chief, for his zeal and exertions on these and other occasions. He was specially mentioned in despatches for his services during the war, and was in consequence promoted to the rank of Captain in January 1855. After the termination of hostilities, he continued in command of the Mediterranean Survey in H.M.S. *Medina* until the close of the year 1863, when he returned to England, and did not again serve actively afloat.

During his long career in the Mediterranean—for he commenced and completed his service on that station—Captain Spratt not only rendered great service to the seaman and the navigator of all nations, by his numerous and excellent surveys, but his cultured tastes and his scientific training enabled him to combine with his practical contributions to navigation, the classical and geological history of the various islands of the Grecian Archipelago, the coasts of Asia Minor, and other portions of the Mediterranean Sea.

He published, among many other scientific papers, 'Report on Deep Soundings in the Mediterranean east of Malta,' 1856-7; 'Remarks on the Comparative Conditions of the Different Mouths and Branches of the Danube,' 1858; 'Experiments and Results on the Currents of the Sea of Marmora, Dardanelles, &c.,' 1858; 'Report on the Delta of the Danube.' In 1846 he published two volumes of 'Travels in Ancient Lycia,' conjointly with Professor E. Forbes.

His latest work was 'Travels and Researches in Crete,' 2 vols., 1864. The remarks of the late Sir Roderick Murchison, in his address to the Royal Geographical Society in 1865 on this work, may be fittingly repeated here: "The travels and researches in the island of Crete by Captain Spratt, R.N., is a work which will rivet the attention and enrich the minds of various readers, whether they be antiquaries and scholars or geographers and men of other sciences. Well may I have spoken elsewhere in this address of that highly instructed branch of the Royal Navy, the Surveyors, for here we see produced by one of them a masterly illustration of the physical geography, geology, archaeology, natural history, and scenery of the diversified island of Crete. In his accurate chart, giving the outlines of the land and the soundings around this broken and deeply indented island, as seen in the geological maps published in these volumes, the author clearly sustains, by data exposed along the shores of Crete, the law laid down by De Saussure on the southern side of the Maritime Alps, that the highest and steepest parts of a coast are always flanked by the deepest waters. . . . When we consider the severe nautical duties which have been performed by Captain Spratt, and know that he is the officer who, called away from peaceful scientific efforts, so distinguished himself afterwards in the late war by boldly and accurately determining the soundings along the coasts of the Crimea, and under the enemies' batteries at Kinburn, thus leading in our fleet to act with effect, we cannot too much admire the many fine qualities which are combined in this gallant seaman. . . . We must not forget that, without the deep soundings and dredgings conducted by Captain Spratt, we should never have obtained the grand views of Edward Forbes on the submarine zones inhabited by different classes of animals, which established an entirely new phase in the inductive reasoning of

geologists, who, after all, are but physical geographers of former conditions of the earth's surface."

Captain Spratt became a Rear-Admiral on the retired list in 1872, and a Vice-Admiral in 1878. He was nominated a C.B. at the close of the Crimean War, and was awarded by the French Government the distinction of officer of the Legion of Honour. He was elected a Fellow of the Royal Society in 1856, and was also a Fellow of the Geological Society. He held the position of Commissioner of Fisheries from 1866 to 1873, and was acting Conservator of the Mersey from 1879 until his death, which occurred at Clare Lodge, Tunbridge Wells, on the 10th of March, 1888.

Robert Henry Wallace Dunlop, C.B.*—Mr. Wallace Dunlop, whose death has been recently recorded, was for twenty-eight years a Fellow of this Society, and his loss will be felt by many of its members and by a wide circle of friends. He belonged to an old Scotch family, being the son of Mr. J. A. Wallace Dunlop, Member of Council, Bombay, and was born in 1823. He was educated at the old East India College, Haileybury, and was classed as highly distinguished in 1843 when he entered the Bengal Civil Service.

This promising commencement to a successful career was again realised at Fort William: he passed in Persian and Hindu, and with a certificate of "high proficiency" in Urdu. His knowledge of Oriental languages and literature was of essential service to him in the varied duties which he, in common with many members of the Indian Civil Service, was called upon to perform.

When Mr. Dunlop was joint magistrate at Jaunpur in 1852, a part of the kingdom of Oude, the State of Rewal, and even British territory, had been ravaged by the notorious outlaw Rundheer Singh. On the facts being brought to Mr. Dunlop's knowledge while on a tour of inspection through his district, he raised a small body of natives, about thirty-four in all, and riding ahead of his men straight into the camp of Rundheer Singh, he effected his capture, though he was surrounded by 300 followers as desperate as himself. For this dashing exploit the young magistrate was presented with a "dress of honour," consisting of a gold sword, dagger, and shield, by the King of Oude, and received the encomiums of the Lieutenant-Governor of the North-West Provinces.

From 1853 to 1856 Mr. Wallace Dunlop was superintendent of the district of Dehra Doon. Here at intervals in the work of his district he found those opportunities for 'Hunting in the Himalayas' of which he published a most interesting account in 1860, a book which was not simply a record of sport, but abounds in original observations and suggestions of value to geographical explorers.

In May 1857, when Mr. Wallace Dunlop, then magistrate and collector at Meerut, was in the Himalaya recruiting his health after an attack of fever, the news reached him of the outbreak of the Mutiny and the massacres at Delhi and Meerut (his own district). It was evident, as he says, that the time had come of which he had frequently reflected on the possibility, when all who bore the Anglo-Saxon name in India would have to join in defending their supremacy, or die hard in losing it. He set off at once for the camp at Delhi, in company with Captain Speke (a brother of the African traveller), who was soon to meet an heroic death in the subsequent struggle. On his arrival he was directed by his Commissioner to proceed at once to take charge of his district. Travelling three consecutive days and nights, and accompanied only by a native policeman, through a country in the very throes of revolt, he arrived at Bhághab, and next day rode into Meerut, and at once took charge of his duties. Meerut, as Colonel Malleon says,† "being only 40 miles

* By Jno. Allen Brown, F.R.G.S., F.G.S.

† 'History of the Indian Mutiny,' vol. iii.

from Delhi, and surrounded by districts in which mutiny was rampant, constituted in June 1857 the one spot on the grand trunk road, running from Allahábád to the North-West, which might be an effectual rallying point for loyal natives, Dunlop had early experience of this truth."

Mr. Dunlop's *locum tenens* had lost his life while taking out a detachment of dragoons, the brigadier had left under orders from headquarters, and had taken with him the greater part of the loyal garrison, and, as Mr. Keene * expresses it, "Meerut was almost without defence." "His energy of character," as Major Williams states, "soon turned the adverse tide of events in our favour, and shortly recovered for the Government the district which had well nigh slipped from its grasp."

He proceeded to organise a volunteer corps, composed of what few Englishmen could be found among the civil and other officers, Eurasians, and a few Sikhs. Thus was formed the corps called the "Kháki Resselah," or "Meerut Volunteer Horse," of whose exploits Mr. Dunlop wrote an account,† and whose deeds are recorded in Colonel Malleeson's 'History of the Indian Mutiny,' as well as in Mr. Keene's excellent work.

The Kbaki Bissala, under the direction of Mr. Dunlop, soon restored order in the villages five miles around Meerut, inhabited by the rebellious Gújars; surrounded the village of Siki, about 14 miles distant, before the alarm could be raised, and after five hours of fierce resistance, the little corps gained a complete victory, punishing the natives for their atrocities to the neighbouring village of loyal Ját, but carefully protecting the women and children.

The crowning exploit of the Meerut Volunteer Horse was the defeat of the redoubtable Sal Mal of Bharut. Mr. Dunlop went against him with a motley force, only 149 strong, and scattered a hostile array of 3500 men, of whom 450 were slain, including Sal Mal himself.

Subsequently the little column, somewhat strengthened, defeated the rebels at Galáoti, and drove them out of Moruana and Bhowan, besides storming Akalpura, where a notorious rebel, Narpát Singh, was slain. This prompt and successful action produced (says Colonel Malleeson) a marvellous effect on the turbulent spirits in the neighbourhood.

For his services at this critical period Mr. Dunlop was in 1860 created a Companion of the Bath. From 1862 to 1865 he was officiating judge at Bareilly, when ill-health compelled him to retire from the service. On his return to England he became an ardent supporter of the volunteer movement, for which his experience and service had so well fitted him. Few men were better known at Wimbledon than the Captain of the Scottish Eight, which Mr. Dunlop afterwards became. He was the author of a work on natation, and his ingenious invention of plates to be attached to the swimmer is well known. His book on the subject is entitled 'Notes on the Science of Natation.'

Mr. Wallace Dunlop married in 1861 a daughter of Mr. J. Dowson, of Dulwich, and left three daughters and three sons; one of the latter is now serving as lieutenant with his regiment in Bengal. He was a man of clear and honest judgment, with the kindly tolerant views of one who had observed men under many phases and in many lands, and he took the deepest interest in all which concerned the intellectual and true moral progress of the community in which he lived. He died at his house, Ellerslie Tower, Ealing, on November 15th last.

* 'Fifty-seven. Some Account of the Indian Districts during the Revolt.' H. G. Keene, C.I.E., M.R.A.S.

† 'Service and Adventure with the Khakee Resselah, or Meerut Volunteer Horse.'

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris, February 3rd, 1888: Dr. HAMY in the Chair. —Captain de Cavalier de Cuverville forwarded a copy of the report of the Commission on Railways in Tongking, which had just been published in the 'Revue Maritime et Coloniale' (December 1887), and gave a *résumé* of the principal points contained in the same. One of the main objects of the Commission was to find a direct means of communication between the southern provinces of China and the coast of Tongking. As a coast terminus for such a line, Port Courbet (Hone-Gay) and the bay of Ha-Long would appear to be the only points fulfilling the necessary conditions of a deep-water harbour, well sheltered, easily defensible, with an outer roadstead offering a good anchorage, and at the same time always accessible. Moreover, the important coal-beds in the immediate vicinity enhance the suitability of this point. After exhaustive inquiry, the Commission unanimously agreed to recommend the following route for the railway:—Hone Gay, Quang Yen, the seven Pagodas, Bac-Ninh, Hanoi, Vich-tri, and the valley of the Red River to Yunnan.—A communication on the schemes for a trans-Siberian railway was transmitted by Baron A. de Bieberstein. It would seem that there are two projects under discussion. According to one, the line should take a northerly direction by way of Iscim, Omsk, Tomsk, Krasnojarsk, Nijni-Ufinsk, and Irkutsk. According to the other, which is supported by Rear-Admiral Copitoff, commander of the Russian squadron in the Pacific, the route should be more to the south, viâ Orenburg, Akmolinsk, Minussinsk, Abatoni, and across Manchuria to Vladivostock on the Pacific. The writer discusses the merits of the two schemes, and concludes that the latter is the more advantageous. The northern line, although the shorter of the two, would cross a marshy and comparatively poor region, and further, the Siberian rivers which it would cut have proved to be of little importance as means of commercial communication. On the other hand, the southern line would traverse the fertile regions of "black earth," rich in minerals, which would attract colonists from the neighbouring countries.—From Tashkend, M. E. Müller, a professor in that town, forwarded a translation of an article which had appeared in a recent number of the 'Turkestan Gazette' on the railway bridge over the Oxus. *A propos* of this communication, M. Venukoff stated that this bridge was over a mile in length, and trains had been running over it since January. The trans-Caspian railway was opened as far as the first Bokharian station north of Chardjui.—Two letters were read with reference to M. Thouar; one, dated 22nd December, 1887, from M. Rouvier, French Minister at Buenos Ayres, and the other from M. J. P. Guillen, from Paris. According to the latter, M. Thouar had met with a most flattering reception on his return to Sucre after his perilous journey to the east of Fort Crevaux, in the course of which he narrowly escaped being murdered by the natives, and was only saved by the arrival of the relief expedition sent in search of him.—Count de Bizemont, Vice-President of the Central Commission, intimated that the centenary of the death of La Pérouse would be celebrated by a meeting on 20th April next, when there would be an exhibition of the relics of the expedition.—M. Brau de St. Pol Lias stated that he had been commissioned by Colonel Versteeg to make a communication with reference to intended explorations in the East Indies. In consequence of a legacy, the Geographical Society of Amsterdam had been able to arrange for a long-cherished scheme for exploring the Dutch possessions in the East. On the 21st of the month M. R. P. Meyer, an officer in the navy, accompanied by M. Wertheim, mining engineer, would start for Java. Colonel Versteeg was engaged in arranging for an exploration of the Little Soenda Islands.—The General Secretary of the Commercial Geographical Society of Paris, M. Gauthiot, announced that one

of the members of that Society had placed at its disposal the sum of 80*l.* for a prize, to be awarded by a special committee for the best practical elementary manual of commercial geography. M. Gauthiot gave some details concerning this competition.—In conclusion, M. Victor Turquan, head of the General Statistical Branch of the Department of Commerce and Industry, read a paper on the geographical distribution of the population of France. The paper was commented upon by M. E. Levasseur.

February 17th, 1888 : Dr. HAMY in the Chair.—M. G. Rolland presented a copy of his recently published book on the geology of Central Tunis, from Kef to Kairuan, being the results of a geological exploration of that region undertaken by the author in 1885.—In announcing the gift of a work by Abbé Petitot, the General Secretary called attention to the former works of the donor. The present book was entitled ‘En route pour la Mer Glaciale,’ and gave an account of a journey to the Slave Lake. The same author, said the Secretary, would shortly publish a work on his explorations in the country between the Great Slave Lake and the Mackenzie river.—M. Venukoff communicated the following news from Russia. M. Schoubine, Assistant Astronomer at the Naval Observatory of Cronstadt, had made a series of magnetic observations in the island of Catline, on which the city is built. Although the island is so small, the magnetic elements are not the same at all points. M. Andreev had recently made an interesting communication to the Geographical Society of Russia on the hydrology of the White Sea. M. Wild, Director of the Central Meteorological Observatory of Russia, had just published a book on the humidity of the atmosphere, the rains and snow in that country.—A reply was received from General Walker, of the Indian Survey Department, to the communication of M. Dutreuil du Rhins, made at a recent meeting, on the subject of the Salwin and the Irawadi. This reply will be inserted in the quarterly ‘Bulletin,’ where M. du Rhins’ paper will also be published.—Colonel Gallieni, writing from Monambugo, on 8th January, 1888, forwarded the following *résumé* of the chief geographical results obtained by MM. Caron and Lefort on their recent voyage* on the Upper Niger, together with a sketch map embodying the same. These results are as follows : The latitude of Timbuktu is about one degree further south than hitherto supposed, while its longitude is 30' more to the east. Surveys for the first time have been made of the Niger from Sansandig to Mopti, via Diafarabe, of the Issa-Ber from Safai to Deboë, and of about 500 miles of the “marigot” Diaklia. The position of Lake Deboë has been determined with the greatest care by observation and triangulation ; its shape is quite different from that shown on existing maps. The position of Bandiaga has been fixed, and also that of many other points for the first time.—In conclusion Dr. Verneau read a paper on the results of his scientific researches extending over five years in the Canary Islands. The traveller thoroughly explored the grottoes among the mountains, which were the cemeteries of the aborigines of the islands. These places, some of them almost inaccessible, were not reached without great labour and fatigue, but the information collected amply repaid the traveller for his exertions, as it will lead to a reconstruction of the history of these natives. The present inhabitants are a mixture of the aboriginal people and all the races which have since come to the islands. They have, however, preserved a certain number of the physical characteristics and many of the customs of the old race. Dr. Verneau shows that the Archipelago was formerly peopled by men of tall stature, with long skulls and broad faces. He regards these Guanches as descended from our ancestors of the quaternary epoch, with whom they appear to be analogous. Later on the Numidians visited these islands, as is evidenced by the

* Proc. R. G. S., 1888, p. 164.

rock-inscriptions. Other peoples followed, among whom the Semitic races should be specially mentioned, as in certain localities they have, by mixing with the Guanches, altered the primitive type. Dr. Verneau also gave some interesting details with regard to the manners and customs of this ancient people, and some notes on the flora and fauna of the islands. The Chairman, on the conclusion of the paper, announced that the Commission of Prizes had awarded the Legerot Prize to Dr. Verneau for the results of his travels.—A letter of a missionary was read, stating that an interesting journey has been made by Père Lecomte in the south-west part of the Portuguese West African possessions. He started from Notre-Dame des Amboellas, on the right bank of the Okashilanda, and after four days' travelling reached N'Dongo, situated in $14^{\circ} 34'$ S. lat., and $15^{\circ} 49'$ E. long., on the left bank of the Cuvangue, an affluent of the Cunene. From this point he proceeded to the basin of the Cului or Upper Okashilanda, which he ascended to the north of the Kandigu and visited the country of the Vamussindas. Turning southwards, he entered the valley of the Okavango and paid a visit to Prince Kihuako. The Okavango receives on its left bank two important tributaries, which flow from north to south, viz. the Cutato and the Cutchi; to the former of these the traveller made an excursion. Then returning to Kihuako, he followed the course of the Okavango and returned to Notre-Dame des Amboellas. A full account of this journey is published, with a map, in the January number of the 'Annales Apostoliques de la Congrégation du Saint-Esprit.' As regards New Guinea, it appears that Père Couppé, of the Yule Island station, has made two more short voyages up the St. Joseph river, and has visited the large and populous villages near its banks. In his third journey he reached Bebeo, overland, by way of the basin of the Hilda. The river flows at about $1\frac{1}{2}$ miles from the village, which lies at the foot of the lower spurs of Mount Yule. At this point its course is from east to west; its depth is $3\frac{1}{2}$ feet, and it has a rapid current. The natives stated that above Bebeo the river is formed by two streams, one of which issues from Mount Yule and the other from the Owen-Stanley range. The Saint Joseph is apparently navigable for about 40 miles.

Geographical Society of Berlin.—March 3rd, 1888: Baron von RICHTHOFEN in the Chair.—The Chairman made a communication with reference to the Eighth Annual Congress of German Geographers, which is to be held in Berlin from 4th to 6th April, and gave some further information regarding the expedition of Dr. von den Steinen, who had written to the effect that he had returned to Cuyabá from his journey to the head-waters of the Xingu, having obtained excellent results from the same.—Baron Toll then spoke upon his journey to the New Siberian Islands. The object of this expedition, which was fitted out at the expense of the Academy of Sciences of St. Petersburg, was to determine whether these islands really consisted of "ice and bones," as the first discoverers of these regions had stated; from what source the bones came; and whether these districts were actually in a state of continual elevation, as might be supposed from the statements as to the hills of driftwood which had been floated thither. In consequence of the difficulties of getting together at once the necessary number of dog-sledges and the corresponding quantity of food for the dogs, which consists of fish, easily smoke-dried, called "inkkola," the exploration of the Yana region was taken into the programme for the first year (1885) of the expedition. The numerous mosquitoes proved a great obstacle to the expedition. They tortured both men and animals almost to the verge of madness. Veils afforded no protection from their attacks. They pierced through the seams of the clothing; only densely smoking fires were of any avail in keeping them at bay, and these were only practicable in camp. The

owners of reindeer drive their herds on to the mountains, whither also the wild reindeer and mountain sheep withdraw in the height of summer. A mammoth, not quite in a state of complete preservation, was found in April 1886, lying in frozen clay on a bed of ice 48 feet in thickness; its position showed it must have been floated up into an already frozen valley. The tender and still existing parts of the animal were eaten by the Tunguses with relish as a delicacy. On the 1st May, 1886, the party, after having wintered in Kasatshe, where a minimum temperature of $-59^{\circ} \cdot 4$ F. ($-50^{\circ} \cdot 8$ C.) was registered, set out for the Great Liakhov Island. On the 16th of the same month the island of Kotelny was reached. Shortly afterwards Baron Toll explored the islands of Fadjev and New Siberia, and then returning to Kotelny, he built on the west coast a substantial winter hut from driftwood. From 6th to 18th August he travelled over the island in continuously cloudy weather, and reached its north point, whence he was able, when the clouds lifted momentarily on one occasion, to descry to the north four mountains in Jannikov Island. The mean temperature of the months June, July, and August was $34^{\circ} \cdot 5$ F.; the maximum of 50° F. was reached on the 12th July. During the "summer" of 1886 six snowstorms were observed; snow fell twenty-three times and rain nineteen times. The snow on all the mountain slopes exposed to the north did not melt away. The vegetable kingdom is very poorly represented. On the other hand the island is very rich in birds, which find a store of food in the pools of water which in summer swarm with the larvæ of insects. Polar bears were not seen, but numerous Eisfûchse, silver-foxes, and wild reindeer; of the latter sixty were killed. The tame reindeer were successfully fed during the journeys on dried fish. On the 1st November the traveller quitted the island of Kotelny, and on the 17th of the same month the expedition was again at Kasatshe. The island of Kotelny consists for the most part of palæozoic rocks, the limestones of which were deposited at the same period as those of the Ural, Altai, &c. The pretended hills of driftwood are brown-coal formations, and the leaf-impressions of foliage-bearing woods which were discovered prove the existence in these regions, as in Spitzbergen, Greenland, &c., of a former tropical vegetation. Upon these old rock-formations repose, to a greater or lesser depth, according to the relief of the ground, more recent formations which contain the remains of the diluvial mammals. These conditions may be especially well observed on the island of Great Liakhov, where connected beds of ice from 60 to 70 feet in thickness, partly clear, and partly broken through by clay strata, may be followed for several miles. In these clay strata are to be found plant-remains, peat-beds, fresh-water shell-fish, and species of willow, which now only reach a line 3° to 4° to the south of their former northern limit. The numerous remains of the mammoth, rhinoceros, two kinds of oxen, the horse, and musk-ox are also found in these strata. Mammoth's teeth were collected to the extent of seven pounds' weight, which being of good quality, fetched on the spot 21 roubles per pound. From this fact it can be clearly seen why the collectors of ivory visit these regions every year in the winter, in spite of the continual risk of losing their lives, in consequence of unfavourable conditions of the ice, and their incredibly small stock of provisions.—Dr. A. Schenk made some remarks from personal observations upon the geological conditions of the Transvaal Republic, and on the goldfields there. The configuration of the country is determined by two mountain chains. The Drakensberg Mountains, which rise to a height of 7000 feet, and traverse the country from north to south, form a plateau, consisting of horizontal slate and sandstone strata, and presenting on its eastern side a very steep declivity, and on its western a gradual slope. This tableland cuts the Transvaal in two, the larger and more elevated portion lying to the west. The eastern and smaller part mainly consists of a range of low granite mountains (further south towards Swazi-

land, of sharply rising metamorphosed slate and sandstone), which slopes away eastwards to the sandy coast plains, into which the lofty porphyritic Lebombo range, running north and south, penetrates. A series of parallel chains extend east and west through the country, the most northerly of which is the Magalisberg, and the most southerly the Witwaterrand. They divide the Transvaal into two parts, the southern and more elevated (4000 to 5000 feet), known as the Hooge Veld, and the northern (2500 to 3000 feet) as the Bosch Veld. The former is connected with the plateau of the Drakensberg, while the latter is separated from it by a low range of granite hills. From the Bosch Veld rises up the mountain mass of the Pilandsberg. North of this the country again rises to extensive tablelands which, under the names of Dwarsberg and Waterberg, spread from west to east, and are connected with the Drakensberg by means of the Makapansberg. To the north of this region the plateaus of the Blue and Zoutpansberg ranges commence, which slope down to the hot lowlands of the valley of the Limpopo. The Drakensberg and the Magalisberg form a climatic divide. On the Hooge Veld, in winter, the days are certainly warm, but the nights are often very cold, while the mild winter of the Bosch Veld permits of the cultivation of tropical plants, coffee, cotton, &c. During the seasons of the rains fevers are prevalent in the latter district, but the Hooge Veld enjoys one of the healthiest climates of the world. These conditions exercise a great influence on the mode of life of the Boers, who have their farms mostly on the Hooge Veld, but when the nights begin to get cold and the grass dry, they descend with their wives and children to their settlements on the Bosch Veld, where they pass the winter. The greater part of the country consists of very ancient rocks, granite, Silurian strata, on the top of which repose more recent strata of Devonian slate, sand, and limestone. In the southern district the peculiar sandstones of the Karoo formation appears to contain a store of coal which has hitherto received much too little attention. By the discovery of the goldfields, which commenced with the discovery of the Tati goldfield, by Karl Mauch, in 1867, the Transvaal has made an unforeseen advance within the last two years. Following upon the discovery of the Lydenburg Fields in 1873 came the opening up of the De Kaap Fields in the year 1883, and last on the list are the recently found goldfields of Witwaterrand, with the flourishing town of Johannesburg, which within a year has grown so rapidly. With regard to the nature of the "finds" on the Malmani river in the west of Transvaal, on the Tugela in Zululand and in the Knysna District in Cape Colony, there is not yet sufficient information to enable a judgment to be formed.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

Hoernes, [Dr.] Moriz.—*Dinarische Wanderungen. Cultur- und Landschaftsbilder aus Bosnien und der Hercegovina.* Wien, Graeser, 1888: pp. viii., 344, and xii. Price 6s. (*Dulau.*)

Dr. Hoernes has travelled much in Bosnia and Herzegovina, and while his book deals largely with the people, history, political condition and antiquities of the countries, there is much information of a geographical character, which will be useful, as our knowledge of the geography of Bosnia and Herzegovina is by no means so complete as it should be. There is a map on the scale of 1:1,150,000.

Samuelson, James.—Bulgaria, Past and Present; Historical, Political, and Descriptive. London, Trübner & Co., 1888: 8vo., pp. xiv. and 247. Price 10s. 6d.

This is a companion volume to Mr. Samuelson's work on Roumania. It is partly the result of the author's own journeys in Bulgaria, and partly compiled from a variety of sources. Its chief value is as a contribution to political geography. In the appendix is a pretty full bibliography of Bulgaria.

ASIA.

Browne, [Major] Edmond Charles.—The Coming of the Great Queen, a Narrative of the Acquisition of Burma. London, Harrison & Sons, 1888: 8vo., pp. 451, maps and illustrations. Price 12s. 6d. [Presented by the Publishers.]

This volume is partly a compilation and partly a record of personal experiences. It is divided into two portions:—Book I., contains History of Burma from the Earliest Times to the Outbreak of the late War; Narrative of Expedition, 1885 (Third War); Events subsequent to the Fall of Mandalay; History, Fluctuations, and future Prospects of Trade; Exports from Lower Burma to Upper Burma, the Shan States, and China; Trade with Foreign Countries; Dacoits and Dacoity; the Burmese Women. In Book II., an account is given of the various tribes inhabiting Indo-China, including the Karens, the Shans, the Chins or Khyins, the Kakyens or Kachins, the Yunanese, the Siamese, the Annamese, and Tonkingese. The volume concludes with the "Indo-Chinese Question."

[Dutch East Indies.]—Holland. East Indies. Colonial Possessions. Admiralty: Naval Intelligence Department (No. 128). February, 1887. Folio, pp. 204. [Presented by the Lords Commissioners of the Admiralty.]

This is an excellent specimen of the valuable work performed by the Naval Intelligence Department, of which we have heard so much recently. The work has been mainly compiled with a view of supplying information on the coal and other resources of the Dutch East Indies, but at the same time contains copious information on the geography of the various islands, their resources, their chief towns, their population, their strategical value, and many other points. The information has been collected by the industrious and intelligent compiler from the most trustworthy sources, including journals and other publications which rarely come before the ordinary reader. The volume is well supplied with maps, and appended is a list of queries on points on which further information is desired.

[India.]—A Manual of the Geology of India. Part IV. Mineralogy (mainly non-economic). By F. R. Mallet, Superintendent Geological Survey of India. Calcutta, Office of the Geological Survey of India. London, Trübner & Co., 1887: pp. 11 and 179, plates.

James, H. E. M.—The Long White Mountain, or a Journey in Manchuria, with some Account of the History, People, Administration, and Religion of that Country. London, Longmans & Co., 1888: 8vo., pp. xxiii. and 502. Price 21s. [Presented by the Publishers.]

This volume is to some extent an expansion of the excellent paper which Mr. James read at the Society last year, and which will be found in the 'Proceedings' for 1887, p. 531. Mr. James has taken much trouble to add to his own observations information from many other sources, so as to produce a fairly complete account of the history and geography of Manchuria. The first six chapters are devoted to the history, the people, the administration, and the religion of the country. The remainder of the volume is occupied with a detailed account of the journey of Mr. James and his companions. There are several good illustrations, and the Society's map; though the coloured plate illustrative of the Dragon Prince's Pool is a poor specimen of this kind of work.

Little, Archibald John.—Through the Yangtse Gorges; or, Trade and Travel in Western China. London, Sampson Low & Co., 1888: 8vo., pp. xv. and 368. Price 10s. 6d.

This volume consists of a transcript of Mr. Little's journal kept by him during a two months' journey from Shanghai to Chungking, the commercial metropolis of Western China. Mr. Little's main object was to find out if it could not be possible to open up the Yangtse to steam navigation and European trade above as well as below the rapids at Ichang. Mr. Little travelled in a boat from Hankow upwards, and as he is a good observer, with some knowledge of geography and geology, his volume is a contribution of some value to our knowledge of the hydrography and physical geography of the region traversed by the Yangtse. He had plenty of leisure to observe, and as he stayed for some time at Chungking, and visited the country in the neighbourhood, he tells us much of its people, its antiquities, and its coal-mines. His introductory chapter on the physiography of the Yangtse valley is specially instructive. The Yangtse, he shows, is rapidly filling up its valley. Not many years ago, in Mr. Little's opinion, the river discharged its waters through a series of lakes, which are getting dried up. He calculates that the quantity of sediment annually brought down by the Yangtse is 5000 million cubic feet, or 2500 times that brought down by the Thames. "Taking the drainage-area of the Yangtse at 500,000 square miles, and estimating the sediment discharged as above, both Captain Blakiston's and Dr. Guppy's figures give a rate of subaerial denudation for the whole catchment basin of about one foot in 3000 years. Estimating four-fifths of this amount of sediment as occupied in raising the banks, and filling up the valley while inundated by the summer floods, the remaining one-fifth is sufficient to create annually a fresh island in the Pacific, one mile square and fifty fathoms deep. The rapid rate at which the coast-line is gaining on the ocean, startling ocular evidence of which is presented to every old resident at Shanghai, is thus not surprising."

Van der Chijs, J. A.—Nederlandsch-Indisch Plakaatboek, 1602-1811. Vierde Deel, 1709-1743. Batavia, Landsdrukkerij; 's Hage, M. Nijhoff, 1887: 8vo., pp. 652.

Wild, H.—Die Regenverhältnisse des Russischen Reiches, mit einem Atlas. St. Petersburg, 1887: 4to., pp. 95 and cclxxxvi. Price 6 roubles. [Presented by the St. Petersburg Academy of Sciences.]

Dr. Wild here discusses the rainfall of Russia in all its aspects and bearings, printing in the appendix the data, collected at the many stations all over Russia, on which his conclusions are based. These conclusions are clearly and strikingly exhibited in the atlas of six maps which accompanies the work.

AFRICA.

[Emin Pasha.]—Emin Pasha in Central Africa, being a Collection of his Letters and Journals. Edited and annotated by Dr. Schweinfurth; Professor F. Ratzel; Dr. R. W. Felkin; and Dr. G. Hartlaub. Translated by Mrs. R. W. Felkin. London, G. Philip & Son, 1888: 8vo., pp. xviii. and 547. Price 16s. [Presented by the Publishers.]

This collected edition of Emin Pasha's letters and journals during the ten years he has been sojourning in Central Africa is most acceptable; for hitherto Emin's rare and valuable writings have been scattered over Petermann's 'Mitteilungen' and elsewhere, and it has been troublesome to consult them. No doubt when Emin has leisure, or when he returns to Europe to rest from his African labours he will give us a fuller and more systematic account of his work. Emin's old friend Dr. Felkin writes an introduction to the volume, giving some interesting personal details. Eduard Schmitzer was born at Oppeln, in Silesia, on March 28, 1840. He was educated in medicine at Breslau and Berlin. In 1864 he went to Turkey, where he obtained an official

position, which enabled him to traverse Armenia, Syria, and Arabia. In 1875 Schmitzer returned home, but was off again in 1876, this time to Egypt, the service of which he entered as Dr. Emin Effendi. He was ordered to join the Governor-General of the Sudan at Khartum, and from thence he was sent to act as Chief Medical Officer in the Equatorial Provinces, of which Gordon Pasha was then Governor. Gordon, as Dr. Schweinfurth justly states, was the very one to value a man like Emin, and to use to the full his gifts and powers. He sent Emin on tours of inspection through the districts which had been annexed to Egypt, and employed him upon several diplomatic missions. In March 1878, after Gordon Pasha had been appointed Governor-General of the whole Sudan, Dr. Emin Effendi received from him the appointment of Governor of the Equatorial Province, which position he has occupied up to the present time. "The state of the province in 1878," Dr. Felkin writes, "when he accepted the post of Governor, is difficult to describe in a few words. . . . Many a man would have shrunk from undertaking the responsibility of inducing order out of such chaos. Not so Emin Effendi. Slowly but firmly, and with ever-increasing success, he became master of the situation, and when I passed through his province for the second time, in 1879, a most wonderful change had taken place. Stations had been rebuilt, discontent was changed into loyal obedience, corruption had been put down, taxation was equalised, and he had already begun the task of clearing his province from the slave-dealers who infested it." The letters and journals in the present volume extend from 1877 downwards. They contain comparatively little about the difficulties which Emin met with in the administration of his province, or about the Mahdi troubles. On the other hand, they abound with information on the geography, natural history, and ethnology of nearly every section of his province and of the neighbouring regions, the results of Emin's incessant journeys during the last ten years. The work has been well edited by the various gentlemen whose names are on the title-page, while Mr. Ravenstein has furnished some valuable notes; added a copious index and glossary, with the latitude and longitude of each place; and an excellent map of the province, coloured ethnologically.

[Madagascar].—The Antananarivo Annual and Madagascar Magazine. No. XI. Christmas, 1887. Edited by the Rev. J. Sibree and Rev. R. Baron. Antananarivo, London Missionary Society, 1887; London, Trübner.

The more important geographical papers in this number are the following:—
Over New Ground: A Journey to Manoutsara and the North-east Coast, by the Rev. R. Baron; M. Grandidier's Scientific Researches in Madagascar. Part I. Geographical, translated by the Rev. J. Sibree; The Affinities of Malagasy and the Melanesian Languages, by the Rev. J. Richardson.

AMERICA.

[America].—Narrative and Critical History of America. Edited by Justin Winsor. Vol. VI. The United States of America, Part I. London, Sampson Low & Co., 1888: 8vo., pp. vii. and 777. Price 30s.

This new volume is entirely devoted to a history of the War of Independence. It is, like the previous volume, richly illustrated with portraits, views, maps, and autographs.

Hasler, [Dr.] Emil.—Centralsüdamerikanische Forschungen. (1) Im Quellgebiet des Paraguay und des Tocantins; (2) Versuch einer Pflanzengeographie Braziliens; (3) Kunst- und Gewerbelebens der Indianer Centralsüdamerikas. "Fernschau," Jahrbuch der Mittel-Schweizerischen Geographisch-Commerciellen Gesellschaft in Aarau, 2tes Band, 1888.

Patton, Jacob Harris.—Natural Resources of the United States. New York, D. Appleton & Co., 1888: 8vo., pp. xv. and 523. Price 12s. 6d. [Presented by the Publishers.]

This account appears to be sufficiently full and comprehensive for general purposes. It deals with the varied natural resources of the United States in No. IV.—APRIL 1888.]

T

their numerous forms, their amount and characteristics. The subjects treated of are coal (including the Alleghany anthracite coal-field, the Alleghany bituminous coal-field, the Central coal-field, Pacific coal-fields, and coal-fields of the Dominion), petroleum, natural gas, iron, gold, silver, quicksilver, copper, lead, zinc, tin, precious stones, &c., &c. The volume also deals with health-resorts in the United States, rainfall, ocean-currents, climate of the Northwest, the Mississippi valley, irrigation, ocean resources, fur-bearing seals, wild game, &c., &c. At the end of the volume will be found a tabulated summary of the output of the mines, &c., for three years.

AUSTRALASIA.

Curr, Edward M.—The Australian Race: its Origin, Languages, Customs, Place of Landing in Australia, and the Routes by which it spread itself over that Continent. Melbourne, John Freres; London, Trübner: 1886. 3 vols. 8vo. and 1 vol. 4to.; i. pp. xix. and 425; ii. pp. vi. and 501; iii. pp. ix. and 710; iv. pp. 45. [Presented by the Author.]

Mr. Curr has in these volumes collected a vast amount of information on the languages, manners, and customs of nearly the whole of the tribes into which the Australians are divided. To the scientific ethnologist and to the geographer the information will be of much value. Mr. Curr has himself made up his mind as to the origin of the Australians. They are, he maintains, of one race; the Africans are also of one race; many of the manners and customs of the two people are alike; many "Australian" words and "African" words have some resemblance; therefore the Australians are "descended" from the negroes. "There seems to me to be no reason to doubt that the Australian is by descent a negro, with a strong cross in him of some other race, but of what race there proved no evidence to show." Among the other ways in which, according to Mr. Curr, the "peopling of Australia by cross-bred negroes" might have occurred, is "the shipwreck of a vessel containing African slaves and their owners of some other race; or by a party of negroes landing at one of the intervening coasts, and seizing some women belonging to a race having long and straight hair, whiskers and beards, and a lighter colour than themselves, absconding with them and reaching these shores either as runaways or castaways." Mr. Curr states in his introduction that he has not made ethnology a study. There is, however, much fact (requiring sifting, no doubt) in these volumes, and little theory.

Wilkins, W.—Australasia: a Descriptive and Pictorial Account of the Australian and New Zealand Colonies, Tasmania, and the adjacent Lands. London, Blackie & Son, 1888: crown 8vo., pp. 252. Price 2s. 6d. [Presented by the Publishers.]

This little volume, principally intended for young people, is a useful compilation on Australasia generally. The opening chapters are devoted to a definition and general description of Australasia; the physical features, climate, natural productions, and aboriginal inhabitants of Australia. A description is then given of each of the Australian Colonies, Tasmania, New Zealand, Fiji, New Caledonia and its dependencies, New Guinea, the Solomon Islands, New Britain, New Ireland, and the Papuan Islands. The volume is illustrated with maps, and woodcuts representing scenery, &c.

GENERAL.

Geiger, [Dr.] Wilhelm.—Die Pamir-Gebiete. Wien, Hölzel, 1887: 8vo., pp. viii. and 184.

Hann, J.—Die Vertheilung des Luftdruckes über Mittel- und Süd-Europa, dargestellt auf Grundlage der 80jährigen Monats- und Jahres-Mittel, 1851–80; nebst allgemeinen Untersuchungen über die Veränderlichkeit der Luftdruck-Mittel und Differenzen sowie deren mehrjährige Perioden. Wien, Hölzel, 1887: 8vo., pp. vi. and 220. [Presented by the Publisher.]

These are the first two parts of the second volume of the 'Geographische Abhandlungen,' edited by Professor Penck. Dr. Geiger presents in his monograph a systematic account of all we know on the Pamir region. His first section contains a review of the history of the exploration of the Pamir and of its general physical conditions, its orography, geology, climate, glacier and snow conditions, limits of cultivation and vegetation, and zoology. In the second part we have a detailed account of the geography of the region in its various sections—(1) the Alai system and the Zarafshan district; (2) the Pamir system and the Penj region. The third part is devoted to the Hindu Kush and the affluents of the left bank of the Amu. There is an excellent physical map of the Pamir.

The importance of Dr. Hann's treatise in relation to the physiography of Central and Southern Europe is evident.

amy, [Dr.] E.-T.—*La Mappemonde d'Angelino Dulcert, de Majorque (1339).* Paris, Ernest Leroux, 1887: 8vo., pp. 15.

——— *Notice sur une Mappemonde Portugaise Anonyme de 1502 récemment découverte à Londres.* Paris, E. Leroux, 1887: 8vo., pp. 16, maps.

——— *Note sur la Mappemonde de Diego Ribero (1529) conservée au Musée de la Propagande de Rome.* Paris, E. Leroux, 1887: 8vo., pp. 10.

——— *Note sur une Carte marine inédite de Giacomo Russo de Messine (1557).* Paris, E. Leroux, 1888: 8vo., pp. 16, map.

[The above four pamphlets were presented by the Author.]

Harrison, W. Jerome, and Wakefield, H. Rowland.—*Earth-knowledge. A Text-book of Elementary Physiography.* London, Blackie & Son [1887]: 8vo., pp. vi. and 164. Price 1s. 6d. [Presented by the Publisher.]

Thornton, John.—*Elementary Physiography: an Introduction to the Study of Nature.* London, Longman & Co., 1888: 8vo., pp. vi. and 248. Price 2s. 6d. [Presented by the Publisher.]

These books are both written mainly on the lines of the new syllabus of the Science Department, South Kensington. They seem both well adapted for getting up the subject of Physiography in that programme. Mr. Thornton's volume is much more profusely illustrated than that of Messrs. Harrison and Wakefield, and is, on the whole, a very satisfactory account of a complicated subject.

Hull, Edward.—*A Sketch of Geological History, being the Natural History of the Earth and of its Prehuman Inhabitants.* London, Deacon & Co., 1887. Price 3s. 6d.

This volume is intended as an introduction to a 'Sketch of Universal History,' issued by the same publishers.

Jackson, Edward P.—*The Earth in Space. A Manual of Astronomical Geography.* Boston (U.S.), Heath & Co., 1887; 8vo, pp. 78. [Presented by the Author.]

This is a sound and, on the whole, clearly written little manual. The illustrations are unusually good.

Joest, Wilhelm.—*Tätowiren, Narbenzeichnen und Körperbemalen. Ein Beitrag zur Vergleichenden Ethnologie.* Berlin, Asher & Co.: folio, pp. viii. and 128. [Presented by the Author.]

Dr. Joest, who is one of our Fellows, and has himself travelled much, has here produced a magnificent and worthy monograph on a subject of great ethnological interest. The work is well printed, and the beauty and evident accuracy of the numerous coloured illustrations are beyond praise. After treating of the bibliography of his subject, and the origin of the word tattoo, Dr. Joest discusses the various causes which may have given rise to the colouring of the body. It is evidently often used as a mere bodily ornament: sometimes as a protection against cold, against the sun, insects, &c., and some-

times to inspire terror into the enemy ; with this he compares the existing survivals of the custom among the females of civilised races. The colours used, and more especially the figures, have often a symbolical meaning, the latter among many people being closely connected with totemism. Dr. Joest describes and discusses the tattooing customs among various peoples, ancient and modern, and shows that it has no religious significance, but is intimately associated with sexual maturity, and with the want of clothing. Hence, according to Dr. Joest, in civilised countries, where the body is always fully clothed, it is only the uncovered extremities that are treated. After all, Dr. Joest concludes that highly civilised Europeans are not separated by so wide a gap as is usually supposed from the so-called savage races among whom tattooing prevails ; but that among all classes, from the highest to the lowest, it will be found still to exist in a more or less modified form. The work is a really useful and abundant collection of data on a subject of great importance.

Jordan, William Leighton.—The "Challenger" Explorations. Printed by Spottiswoode & Co., 1888: 8vo., pp. 15. [Presented by the Author.]

Langler, John R.—Hughes's Picturesque Geographical Readers. London, Joseph Hughes, 1887: 8vo., First Standard, pp. 112; Second Standard, pp. 128. [Presented by the Author.]

These are essentially reading books, and not text-books, and in the hands of a good teacher ought to prove useful for their purpose.

[**Ortelius.**—*Ecclesiæ Londino-Batavæ Archivum Tomus Primus. Abrahami Ortelii (Geographi Antverpiensis) et Virorum Eruditorum ad Eundem et ad Jacobum Colium Ortelianum (Abrahami Ortelii Sororis Filium) Epistolæ. Cum aliquot aliis Epistolis et Tractatibus quibusdam ab utroque collectis (1524–1628). Ex Autographis mandante Ecclesiâ Londino-Batava, edidit Joannes Henricus Hessels. Cantabrigiæ, Typis Academiæ sumptibus Ecclesiæ Londino-Batavæ, 1887: 4to., pp. lxxv. and 966. Price 3l. 10s.*

This monumental volume is creditable to the zeal and industry of the editor and the enterprise of the publishers. Abraham Ortelius did a great deal in his time for geography and cartography, and the correspondence in this volume contains much that will be useful to the student of the progress of geography, including as it does information on the maps with which Ortelius and his friends (among whom were Hakluyt, Mercator, and Humphrey Lhuyd) were dealing at various times, and the material on which their construction was based. The collection consists of (1) Letters written by Abraham Ortelius (b. 1528, d. 1598) to his learned friends and patrons; (2) Letters written by the latter to Ortelius; (3) Letters written to the nephew of Ortelius, Jacobus Colius (Cole), a learned merchant of London; (4) a few letters and documents which, probably, had come into the hands of Ortelius or his nephew, as collectors of autographs and other literary records. There are 376 documents altogether, mostly in Latin, but many of them in Dutch. The collection embraces the years 1524 to 1628. The originals, from which the present texts are printed, belong to the Dutch Church, Austin Friars, London, which has, perhaps, been in possession of them since the year 1628. Mr. Hessels gives a history of the letters up to the date of their coming into his hands for the purpose of preparing them for the press. In his introduction, he gives a sketch of the life of Ortelius, with a bibliography of the editions of the *Theatrum*, a list of maps in that collection, and other useful information. Prefixed to each letter is a more or less detailed synopsis of the contents in English. There are copious footnotes and appended notes, and an excellent index. Reproductions are given of some of the sketches referred to in the letters, including one of an arrangement for rolling maps, as suggested by Hakluyt, "as most dwelling-houses are not spacious or light enough to contain a large map fully spread out."

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Österreichisch-Ungarische Monarchie.—Die —, mit dem Occupations-Gebiete Bosnien und Hercegovina, im Masse 1 : 900,000 or 12·4 geographical miles to an inch. Bearbeitet und herausgegeben vom k. k. militär-geographischen Institute in Wien, 1888. 6 sheets. Price 18s. (*Dulau.*)

Russischen Reiches.—Regen-Verhältnisse des —. Nach H. Wild. Petermann's 'Geographische Mittheilungen,' Jahrgang 1888, Tafel 6. Gøtha, Justus Perthes. (*Dulau.*)

Sverige, Norge, Danmark och Finland.—Karta öfver —, mit Nebenkarten, Island, Färöer und Grönland, von C. J. O. Kjellström. Stockholm, F. and G. Beyer. 2 sheets, Price 6s. (*Dulau.*)

ORDNANCE SURVEY MAPS.

Publications issued during the month of February 1888.

1-inch—General Maps:—

ENGLAND AND WALES (New Series): 239, outline, containing Hatfield, Hertford, Hoddesdon, St. Albans, Waltham Abbey, Ware, &c., 1s. 284, with hills engraved, containing Basingstoke, Odham, &c., 1s.

6-inch—County Maps:—

ENGLAND AND WALES: **Anglesey:** 2 S.E., 6 N.W., N.E., S.W., S.E., 12 N.W., S.W.; 1s. each. **Bedfordshire:** 31 N.W.; 1s. (Bedfordshire is now complete on the 6-inch scale in 112 quarter-sheets at 1s. each.) **Brecknockshire:** 7 S.W., 9 S.E., 14 N.W., 15 N.W., 17 S.W., S.E., containing Hay, 22 N.W., 27 S.E., 44 N.W., N.E.; 1s. each. **Cambridgeshire:** 9 S.E., 31 N.W.; 1s. each. **Cardiganshire:** 34 S.W., 35 S.E., 36 S.E., 41 S.W., 47 N.W.; 1s. each. **Carmarthenshire:** 1 S.W., 2 S.E., 3 S.E., 7 S.W., 15 N.W., N.E., S.W., S.E., 24 N.W., S.W., 39 S.W.; 1s. each. **Carnarvonshire:** 37 N.W.; 1s. **Cornwall:** 31 S.E., 39 N.E., 62 N.E., 66 N.W., 67 S.W., 68 S.W., S.E., 69 N.W., N.E., 71 S.W., 73 S.W., S.E., 75 N.E., 80 S.W., 85 N.E.; 1s. each. **Devonshire:** 19 N.W., containing Bideford, 78 N.W., 79 N.W., N.E., S.W., 91 N.W., N.E., S.W., S.E., 101 S.E., 109 N.E.; 1s. each. **Dorsetshire:** 21 S.W., 22 N.W., N.E., S.W., 31 N.W., 35 N.E., S.E., 39 N.W., N.E., S.W., S.E., 40 N.W., N.E., S.W., 41 S.W., 47 N.W., 49 N.W.; 1s. each. **Herefordshire:** 17 N.W., S.W., 30 S.E., 50 S.W., 53 N.E., 54 S.W.; 1s. each. **Huntingdonshire:** 1 S.E., 2 S.E., 4 S.E., 5 N.W., S.W., 8 S.E., 9 N.W., S.E., 12 N.E., 13 N.W.; 1s. each. **Leicestershire:** 41 N.E., 42 N.W.; 1s. each. **Lincolnshire:** 77 S.W., 81 N.W., S.W., S.E., 89 N.W., N.E., S.W., 94 S.E., 100 S.E., 123 N.E., 124 N.E., S.W., S.E., 126 N.W., N.E., S.E., 127 S.W., 128 S.W., 132 S.W., 142 N.W., containing Spalding; 1s. each. **Merionethshire:** 5 S.E., 6 N.W., N.E., 7 S.W., 13 N.W., N.E., 29 N.W., S.W., 34 N.W., S.E., 41 S.W., 42 N.W., N.E., S.E.; 1s. each. **Montgomeryshire:** 18 N.E., S.E., 51 N.W.; 1s. each. **Norfolk:** 31 N.E.; 1s. **Nottinghamshire:** 12 N.E.; 1s. (Nottinghamshire is now complete on the 6-inch scale in 187 quarter-sheets at 1s. each.) **Radnorshire:** 7 N.W., 30 N.W., S.W., 36 S.W., S.E.; 1s. each. **Shropshire:** 43 N.E., S.E., 52 N.W.; 1s. each. **Somersetshire:** 60 N.W., S.W., 68 S.E., 69 S.W., 70 N.E., 78 N.W., S.W., S.E., 79 S.W.; 1s. each. **Staffordshire:** 8 N.W., 14 N.W., S.W., 39 N.W.; 1s. each. **Suffolk:** 20 N.W.; 1s. **Warwickshire:** 6 S.W., 10 N.E., 11 N.W., S.W., containing Nuneaton; 1s. each.

25-inch—Parish Maps:—

ENGLAND AND WALES: **Brecknockshire:** XVIII. 9, 13, XX. 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, XXI. 1, 2, 5, 6, 9, 10, 18, XXVII. 1, 2, 5, 6, 9, XXVIII. 3, 4, 7, 8, 11, 12, 15, 3s. each; XXVIII. 16, 4s.; XXIX. 9, 15, XXXIII. 12, XXXIV. 11, 14, XXXV. 11, XXXVI. 10, XL. 6, 3s. each. **Cambridgeshire:** V. 12, 4s.; VI. 5, 3s.; VI. 7, 4s.; VI. 9, 3s.; VI. 15, VII. 14, 15, X. 7, 8, 11, 4s. each; X. 14, 3s.; X. 16, XI. 1, 2, 6, 4s. each; XI. 9, 10, 3s.; XI. 13, 14, XII. 9, 4s. each; XIII. 1, 5s.; XIV. 4, 7, 8, 11, 15, XV. 8, XVI. 4, XVII. 10, XX. 11, 15, XXI. 5, 15, 16, 4s. each; XXIV. 4, 3s.; XXIV. 7, 8, 4s. each; XXV. 1, 2, 3s. each; XXV. 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 4s. each; XXX. 1, 3s.; XXX. 3, 4, 4s. each; XXX. 5, 7, 8, 3s. each; XXX. 9, 4s.; XXX. 14, XXXIII. 13, XXXIII. 4, 6, 7, 8, 9, 11, 13, 14, 15, 3s. each; XLV. 4, 4s.; XLV. 7, LII. 3, 3s. each. **Cardiganshire:** II. 11, 15, 16, IV. 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 13, 15, 16, VII. 1, 2, 3, 4, 5, 6, XIV. 3 and 4 (on one sheet), XIV. 8, XV. 1, 2, 3s. each. **Carmarthenshire:** VIII. 10, XVI. 15, 16, XVII. 1, 16, XIX. 9, XXV. 4, 7, 10, 11, 16, LII. 2, 3s. each. **Devonshire:** CXV. 16, 3s.; CXV. 9, 16, 4s. each; CXVI. 4, CXV. 13, CXVII. 6, 3s. each. **Dorsetshire:** XII. 5, 6, 9, 10, 14, 3s. each; XIII. 3, 4s.; XIV. 4, 3s.; XIV. 9, 4s.; XIV. 10, 13, XV. 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 3s. each. **Gloucestershire:** XXVI. 11, 6s. 6d.; XXVI. 12, 5s. **Herefordshire:** XXIV. 1, 2, 5, 3s.; XXIV. 14, 4s.; XXVIII. 16, XXIX. 1, 5, 6, 10, XXXI. 1, 2, 5, 6, 9, 10, 3s. each; XXXI. 12, 4s.; XXXI. 13, 14, XXXII. 13, XXXVII. 2, 3s. each; XXXVI. 3, 4s.; XXXVIII. 1, 2, 4, 6, 7, 8, XXXIX. 2, 5, 6, 3s. each; XL. 4, 5s.; XLVIII. 10, 3s. **Huntingdonshire:** VI. 11, 15, XI. 15, 4s. each; XV. 4, 3s.; XV. 7, 8, 4s.; XXIII. 13, XXVI. 6, 7, 9, 11, 13, 14, 15, 3s. each; XXVIII. 4, 4s.; XXVIII. 7, 8s. **Leicestershire:** XXXI. 9, 12, 13, 3s. each. **Lincolnshire:** XIII. 2, 3, 8, XXI. 3, 4, 8, 11, 12, 13, 16, XXIX. 2, 3, 4, 5, 7, 9, 10, 11, 14, 16, XXXVIII. 7, XLVI. 3, 9, 10, 13, 14, 3s. each; LXXXVII. 10, LXXXVIII. 1, 4s. each. LXXXVIII. 4, 5, 9, 14, 15, LXXXV. 2, 3, LXXXVI. 3, 8, XCV. 3, 3s. each

XCIV. 4, 4s.; XCV. 5, 9, XCVI. 2, 13, XCVII. 9, 10, 13, CXIII. 10, 14, CXXII. 2, 3s. each; CXIII. 7, CXLI. 11, 4s. each; CXLVI. 1, 2, 3, 4, 6, 7, 3s. each; CXLVI. 8, 4s.; CXLVI. 11, 14, 16, CXLIX. 1, 6, 4s. each; CLI. 3, 7, 8, 3s. each. **Marionethshire:** XV. 13, XXIII. 2, 5, 9, 13, XXXIX. 11, 3s. each. **Montgomeryshire:** VII. 4, 8, IX. 4, XII. 11, 12, 16, XX. 11, 12, 15, 16, XXVI. 1, 2, 4, 5, 7, 8, 12, XXVII. 1, 2, 3, 4, 5, 6, 7, 8, 9, 16, XXXIII. 8, XXXIV. 6, XXXIX. 4, 3s. each. **Norfolk:** XXXII. 10, 5s.; XXXII. 14, 4s.; XLIV. 6, LXVIII. 1, LXIX. 1, 5s. each; LXXIX. 4, LXXX. 7, 10, 4s. each. **Northamptonshire:** II. 7, 8, 3s. each; XXV. 10, 14, 5s. each. **Nottinghamshire:** XIII. 3, 6s. 6d. **Radnorshire:** XXXIV. 1, 2, XXXVII. 1, 3s. each. **Rutlandshire:** VII. 6, 14, 3s. each. **Somersetshire:** XXXVII. 5, 9, 3s. each; XXXVII. 12, 4s.; XXXVII. 13, 14, 3s. each; XXXVII. 15, 4s.; XXXVIII. 5, 3s.; XXXVIII. 9, 14, XLI. 2, 4s. each; XLI. 6, 10, 3s. each; XLI. 11, 4s.; XLI. 14, 15, 3s. each; XLI. 16, 4s.; XLIII. 7, LXXXI. 7, 8, 3s. **Warwickshire:** XV. 4, 7, 8, 3s. each; XIX. 4, 8, 4s. each; XX. 1, 2, 3s. each; XX. 5, 4s.; XX. 7, 3s.; XX. 14, 4s.; XX. 15, 3s.; XXII. 1, 4s.; XXII. 3, 3s.; XXII. 6, 4s.; XXII. 8, 3s.; XXII. 9, 4s.; XXII. 14, XXIV. 11, XXV. 7, 3s. each; XXV. 9, 10, 4s. each; XXV. 12, 3s.; XXV. 13, 14, 4s. each; XXVI. 6, 3s.; XXVI. 8, 4s.; XXVI. 13, XXVII. 1, XXVIII. 9, 10, 13, 3s. each; XXVIII. 14, 4s. **Wiltshire:** LVI. 16, LVII. 9, 13, LVIII. 4, LIX. 7, 3s. each. **Worcestershire:** XXXIX. 4, 3s.

Town Plans.—10-foot scale:—

ENGLAND AND WALES: Birmingham and environs, XIII. 13, 1, 2, 3, 7, 8, 11, 13, 18, 19; XIII. 16, 10; LXVIII. 14, 9; LXXII. 7, 23; LXXII. 18, 19; 2s. each. **Dorchester,** XL. 15, 7, 12, 13, 14, 15, 19, 24, 25; XL. 16, 21; 2s. each. **Lincoln,** LXX. 7, 7 (containing the Cathedral), 11; 2s. each. **Spalding,** CXXXIV. 14, 17, 18, 21, 22, 23; CXLII. 2, 1, 2, 6, 7; 2s. each. **Totnes,** CXXI. 5, 14, 19, 23, 24, 25; CXXI. 6, 16, 21; CXXI. 9, 5; 2s. each.

(*Stanford, Agent.*)

ASIA.

Nordenskiöld, A. E.—Den första på verkliga iakttagelser grundade karta öfver norra Asien.

The original, from which this map is copied, is in the archives of Moscow and is dated 1668. In the pamphlet which accompanies the map, Professor Nordenskiöld gives some interesting facts with reference to the early cartography of Northern Asia. An examination of the map shows that, for some reason, no allowance has been made for the variation of compass, possibly owing to the draughtsman being in ignorance of its existence, which however seems improbable, as this phenomenon had been suspected by Columbus in the year 1492. And the whole question had been discussed by Burrows in 1580, who found it at that date to be $11^{\circ} 15'$ E. at Limehouse, and afterwards by Gillebrand, professor of astronomy in Gresham College, who found the variation of compass at Deptford in 1634 to be $4^{\circ} 4'$ E., and it is more than probable that the results of these observations were well known to scientific men all over Europe. In order to facilitate the work of recognition, there is a second copy of the map, on which the present names of places occurring on the original are given.

AFRICA.

Kassala.—Joseph Menges' Reisen zwischen — und dem Setit. Scale 1:1,000,000 or 13·6 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1888, Tafel 5. Gotha, Justus Perthes. (*Dulau.*)

AMERICA.

Argentine Republic.—Diagram of Railways in the —, 1888. Scale 1:3,940,000 or 54 geographical miles to an inch. Arranged by L. B. Tamini, m.s.a., 5, Copthall Buildings, London, E.C.

British Columbia.—Map of a portion of the Southern Interior or —, embodying the explorations made in 1877 by G. M. Dawson, and in 1882–4 by Amos Bowman. Scale 1:506,880 or 6·9 geographical miles to an inch. Department of the Interior, Geological and Natural History, Survey of Canada Alfred R. C. Selwyn, c.m.g., LL.D., F.R.S., &c., Director. 1888. Preliminary edition, not geologically coloured. December, 1887.

The topography of this map is taken from original data, procured by reconnaissance and mountain transit work, the stations marked with a triangle are those of which the positions in latitude and longitude have been fixed by astronomical observation, and triangulations from boundary survey points, and railway points telegraphically determined. The courses of the Fraser river to Lytton, and the Thompson river have been chiefly taken from the Canadian

Pacific Railway Surveys, and for the region bordering on the 49th parallel, the work of the Boundary Commission, 1858-62, has been utilised. For the districts of Kamloops, Nicola, and Okanagan, the Provincial Land Surveys have been used, and former explorations, embodied in Trutch's map have been added to, or corrected by the surveys of Richardson, 1871, by G. M. Dawson, 1877, and Amos Bowman, 1882-84.

The map is very neatly drawn, the rivers being in blue, show the drainage system of this portion of British Columbia in a remarkably clear manner, the heights of numerous stations are given in feet, while all roads, trails, and survey expedition routes are indicated.

Santa-Fé.—Plano de la Provincia de —, República Argentina, America del Sud. Segun él publicado por el Departamento Topográfico en 1886, corregido y aumentado con los últimos datos para servir á la obra del Censo General, levantado durante la administracion del Dr. Dn. José Galvez, por Gabriel Carrasco, Director y Comisario General del Censo, aprobado por Decreto del Exmo. Gobierno de la Provincia, de Diciembre 12 de 1887. Scale 1:844,000 or 11·5 geographical miles to an inch. Lit. Tip. Müller & Woelflin, Rosario, 1888. (*Dulau.*)

All agricultural colonies, railways, telegraph stations, &c., are shown on this map, together with the boundaries of departments and districts. The map is chiefly interesting as showing the parts of the province most occupied by agricultural colonies, nearly all the land in the central part of the province having been taken up by these communities, doubtless on account of its having railway communication with other portions of the Argentine Republic, while to the north and south, although very few agricultural colonies have been formed, the whole of the land appears to be in the hands of private individuals, with the exception of the swamps and forest bordering on the Rio Parana. This map should be useful to any person intending to visit the country with a view to settling there, as it has been carefully compiled from statistics gathered from the last census returns.

Sinu, Rio.—Republica del Colombia. Departamento de Bolivar. Plano del Rio Sinú. Desde su confluencia con el Rio Charudosas hasta su desembocadura en la bahia de Cispata, su hoya hidrografica, poblaciones y su posicion con relacion al Rio San Jorge en su origen. Levantado y publicado por Federico A. A. Simons, Ingeniero Civil, y Miembro de la Sociedad Real de Geografia. Londres, 1887. Price 5s. (*Stanford, agent.*)

Although the region included in this map was among the first to be explored, no good map or precise history of the country has ever been published. The expedition under Codazzi did not reach the State, on account of the death of its leader at Espiritu Santo in 1858, and the river Sinú, for want of better information, figures on the official map of 1864 as a series of knots, or several rivers running into each other. The most correct map of this district, previous to that now under consideration, was a small one by MM. Lacherme and Verbrugghe, which was printed at Bordeaux, for private circulation, by a French agricultural society. It is, however, very defective between the mouths of the lower Sinú and Auguas Prietas.

The necessity of having an accurate map of this region seems at last to have dawned on the authorities, and Mr. Simons, while surveying for the National Government, was requested to pay especial attention to the Sinú valley, and make a separate map of it on an enlarged scale, the result being the map now before us. The area included extends from lat. 7° 40' N. to lat. 9° 27' N., and from long. 75° 36' W. to long. 76° 18' W. The positions of seventeen places have been fixed by astronomical observation. The rivers are in blue, the hill-work is shaded with brown chalk, mule-tracks are shown, and taken altogether, the map is a very creditable specimen of what may be done by an energetic surveyor in three months.

AUSTRALASIA.

Chatham Islands.—Map of the —, from Surveys by S. P. Smith and John Robertson, 1868 and 1883. Scale 1:126,290 or 1·73 geographical miles to an inch. With Key Map showing the position of the Chatham Islands relative to New Zealand, and inset plans of Waitangi and adjacent country, Rangitutahi or Sisters (part of Chatham Islands group), and Rangiauria or Pitt Island (part of Chatham Islands). Photolithographed at the General Survey Office, Wellington, N.Z., November, 1887. Price 5s.

CHARTS.

United States Charts.—No. 1046, Todos Santos Bay, West Coast of Lower California. Price 1s. 6d.—Pilot Chart of the North Atlantic Ocean, March 1888. Published at the Hydrographic Office, Navy Department, Washington, U.S.A., Commander J. R. Bartlett, U.S.N., Hydrographer to the Bureau of Navigation.

ATLASES.

Black, A. C.—General Atlas of the World. New and Revised Edition. Embracing the latest discoveries, new boundaries, and other changes, accompanied by Introductory Letterpress and Index. Edinburgh, Adam and Charles Black, 1888. Price 3l. 3s.

This is a new edition of Black's well-known atlas. It contains twenty-seven pages of explanatory letterpress, seven physical, and forty-eight political maps. Generally speaking, the work of correction has been fairly carried out, but it still contains many errors, among which perhaps the most striking appears on map 51, in which the physical geography of Brazil is very badly laid down, it being quite evident that the draughtsman neglected to use such recent material as the physical map of Brazil published in the R.G.S. 'Proceedings.' On maps 48 and 50 the new capital of the Argentine Republic does not appear, and the orthography in maps 32 and 34, India and China, is not that now in use. We might mention many other errors, but these will suffice to show the difficulty attendant on bringing an old atlas up to date, especially when the corrections to be made are numerous, and after sweeping changes, as in the case of India, have been made in the orthography.

France.—Atlas Historique de la — depuis César jusqu'à nos jours, par Auguste Longnon, Membre de l'Institut. Deuxième Livraison. Paris, Librairie Hachette et Cie., 1888. With letterpress. Price 9s. 6d. (*Dulaud*.)

This is the second issue of this atlas; it is accompanied by a pamphlet containing explanatory letterpress, in which the authorities on which the maps are based are quoted, together with a list of the ancient and modern names of all places shown upon the maps. The following maps are contained in this part of the atlas:—Pl. VI. La France au IX^e et au X^e siècle, Neuf cartes représentant l'état politique de la France en 817, 843 (traité de Verdun), 855, 863, 870, 880, 890, 912 et 940. Pl. VII. à X. La Gaule sous les Carolingiens et plus spécialement au X^e siècle. Deux cartes annexes représentent la Gaule suivant les provinces civiles ecclésiastiques du X^e siècle.

United States.—Appleton's Atlas of the —, consisting of General Maps of the United States and Territories and a County Map of each of the States, together with descriptive text outlining the history, geography, and political and educational organisations of the States, with latest statistics of their resources and industries. New York, D. Appleton & Co., 1888. London Agents, William Allen & Co.

In this atlas a separate county map is given for each state of the Union; these are accompanied by explanatory and statistical letterpress founded on the information collected during the taking of the last census. The maps are well drawn, and not overcrowded with names, all means of communication are shown, and, taken altogether, it is a very useful little work of reference.



ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by Colonel H. H. GODWIN-AUSTEN, F.R.S., J. K. LAUGHTON M.A., and DOUGLAS W. FRESHFIELD, M.A. Contents: Hints on Surveying and Astronomical Observations. John Coles, F.R.A.S.—Meteorology. R. Strachan, F.M.S.—Geology. W. T. Blanford, F.R.S.—Natural History. H. W. Bates, F.R.S., Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.—Anthropology. E. B. Tylor, D.C.L., F.R.S.—Photography. W. F. Donkin, M.A.—Medical Hints. G. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department.—General Outfit. Colonel J. A. Grant, C.B., Edward Whympers, and others. Price, in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, W.; and to be had of Edward Stanford, 55, Charing Cross, S.W.

Instruction for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. Surveying and Mapping, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. Geology, including practical training in the field. By Mr. W. Topley, of the Geological Survey; President of the Geologists' Association. 3. Botany. By Mr. N. E. Brown, of the Herbarium, Kew. 4. Photography. By Mr. John Thomson, Author of 'Photographic Illustrations of China and its People,' and other works.

The lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2s. 6d.

Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers, Vol. II. Part 2.—Now Ready.—CONTENTS:—A Bibliography of Algeria. By Lieut.-Colonel Sir ROBERT LAMBERT PLAYFAIR, K.C.S.I., H.M. Consul-General, Algiers.

* * Fellows who have not applied for the Parts as published, can have Vol. I. complete by applying at the offices of the Society, 1, Savile Row, W.

MARION & CO.'S PHOTO SUPPLY WAREHOUSE, 22 & 23, Soho Square, London, W.

PHOTOGRAPHIC SETS, ready for use, with full instructions.

FREE LESSONS to Purchasers at our Gallery in Soho Square.

THE EMPIRE SETS, of best finish and material, will stand any climate, either extremes of heat or cold. Made for Plates $6\frac{1}{2} \times 4\frac{1}{4}$, $8\frac{1}{2} \times 6\frac{1}{2}$, 10×8 , 12×10 , and 15×12 .

SMALL PORTABLE CAMERAS of the Detective kind. The Parcel, Metal Miniature, The Academy, and Warwick Brooke's.

ENLARGING APPARATUS, which will enlarge small plates taken by the small Detective Cameras up to 15 or 18 inches. These apparatuses also serve as Magic Lanterns.

BERTHON'S PORTABLE COLLAPSIBLE STUDIO and Dark Room, measuring 16 ft. \times 8 ft. \times 8 ft., weighing 1 cwt. complete, ready for travelling.

BERTHON'S COLLAPSIBLE DARK TENT. Very Light, Roomy, and Portable.

COWAN'S PHOTO DEVELOPING CABINET, complete, with Lead Sink, Tables, Tap, Dishes, Bottles, &c., &c., all complete for work.

CATALOGUES FREE ON APPLICATION.

22 and 23, SOHO SQUARE, LONDON, W.

DR. J. COLLIS BROWNE'S CHLORODYNE

ONLY GENUINE.



ORIGINAL AND

IS
THE GREAT
SPECIFIC
FOR
CHOLERA,

We have never used any other form of this medicine than Collis Browne's, from a firm conviction that it is decidedly the best, and also from a sense of duty we owe to the profession and the public, as we are of opinion that the substitution of any other than Collis Browne's is a deliberate breach of faith on the part of the chemist to prescribe and patient alike.—We are, Sir, faithfully yours, SYMES & CO., Members of the Pharm. Society of Great Britain, His Excellency the Viceroy's Chemists.

**COUGHS,
COLDS,
ASTHMA,
BRONCHITIS.**

DR. J. COLLIS BROWNE'S CHLORODYNE.—Dr. J. C. BROWNE (late Army Medical Staff) DISCOVERED a REMEDY to denote which he coined the word CHLORODYNE. Dr. Browne is the SOLE INVENTOR, and, as the composition of Chlorodyne cannot possibly be discovered by Analysis (organic substances defying elimination), and since the formula has never been published, it is evident that any statement to the effect that a compound is identical with Dr. Browne's Chlorodyne must be false.

This Caution is necessary, as many persons deceive purchasers by false representations.

DR. J. COLLIS BROWNE'S CHLORODYNE.—Vice Chancellor Sir W. PAGE WOOD stated publicly in Court that Dr. J. COLLIS BROWNE was UNDOUBTEDLY the INVENTOR of CHLORODYNE, that the whole story of the defendant Freeman was deliberately untrue, and he regretted to say it had been sworn to.—See *The Times*, July 13th, 1864.

DIARRHŒA, DYSENTERY. GENERAL BOARD OF HEALTH, London, REPORT that it ACTS as a CHARM, one dose generally sufficient. Dr. GIBBON, Army Medical Staff, Calcutta, states:—"2 DOSES COMPLETELY CURED ME OF DIARRHŒA."

From SYMES & Co., Pharmaceutical Chemists, Simla. Jan 5, 1880.

To J. T. DAVENPORT, London.

DEAR SIR,—We congratulate you upon the widespread reputation this justly-esteemed medicine has earned for itself all over the East. As a remedy of general utility, we much question whether a better is imported, and we shall be glad to hear of its finding a place in every Anglo-Indian home. The other brands, we are happy to say, are now relegated to the native bazaars, and, judging from their sale, we fancy their sojourn there will be but evanescent. We could multiply instances *ad infinitum* of the extraordinary efficacy of **DR. COLLIS BROWNE'S CHLORODYNE** in Diarrhœa and Dysentery, Spasms, Cramps, Neuralgia, the Vomiting of Pregnancy, and as a general sedative, that have occurred under our personal observation during many years. In Choleraic Diarrhœa, and even in the more terrible forms of Cholera itself, we have witnessed its surprisingly controlling power.

DR. J. COLLIS BROWNE'S CHLORODYNE is the TRUE PALLIATIVE in NEURALGIA, GOUT, CANCER, TOOTHACHE, RHEUMATISM.

DR. J. COLLIS BROWNE'S CHLORODYNE is a liquid medicine which assuages PAIN of EVERY KIND, affords a calm, refreshing sleep WITHOUT HEADACHE, and INVIGORATES the nervous system when exhausted.

DR. J. COLLIS BROWNE'S CHLORODYNE rapidly cuts short all attacks of EPILEPSY, SPASMS, COLIC, PALPITATION, HYSTERIA.

IMPORTANT CAUTION. The IMMENSE SALE of this REMEDY has given rise to many UNSCRUPULOUS IMITATIONS. Be careful to observe Trade Mark. Of all Chemists. 1s. 14d., 2s. 9d., and 4s. 6d. SOLE MANUFACTURER J. T. DAVENPORT, 33, Gt. Russell St., W.C.

VOL. X., No. 5.
New Monthly Series.]

MAY, 1888.

[To Non-Fellows,
PRICE 1s. 6d.

PROCEEDINGS

OF THE

Royal Geographical Society

AND

Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE		PAGE
ON THE RUBY MINES NEAR MOGOK, BURMA. By ROBERT GORDON, C.E.	261	GEOGRAPHICAL EDUCATION IN TRAIN- ING COLLEGES AND ELEMENTARY SCHOOLS	297
LECTURES ON GEOGRAPHY, DELIVERED BEFORE THE UNIVERSITY OF CAM- BRIDGE, 1888. By General R. STRACHEY, R.E., F.R.S., President. LECTURE IV.	275	GEOGRAPHICAL NOTES	300
MR. F. C. SELOUS'S FURTHER EXPLORA- TIONS IN MATABELE-LAND.	293	CORRESPONDENCE	309
		REPORT OF THE EVENING MEETINGS	310
		NEW GEOGRAPHICAL PUBLICATIONS	311
		NEW MAPS	321

MAPS.

RUBY MINES DISTRICT, BURMA	324
MATABELE AND MASHONA LAND	324

713 LONDON: EDWARD STANFORD, 55, CHARING CROSS, S.W.
 PARIS: ANDRÉAU-GOUJON. MANCHESTER: JOHN HEYWOOD. LEIPZIG: F. A. BROCKHAUS.
 VIENNA: ARTARIA & Co. EDINBURGH: DOUGLAS & FOULIS. NEW YORK: SCRIBNER & WELFORD.
 HAMBURG: L. FRIEDERICHSEN & Co. DUBLIN: HODGES, FOSTER & Co. PHILADELPHIA: LIPPINCOTT & Co.
 ST. PETERSBURG: WATKINS & Co. BERLIN: D. REIMER. MELBOURNE: GEORGE ROBERTSON & Co.,
 LIMITED.

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR	"
KURBACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

SUMMER TOURS IN SCOTLAND. GLASGOW and the HIGHLANDS.

(Royal Route via Crinan and Caledonian Canals.)

Tourists' Special Cabin Tickets issued during the Season, valid for six separate or consecutive days'
(sailing by any of Mr. Macbrayne's Steamers, £3.

THE ROYAL



MAIL STEAMERS

Columba,	Chevalier,	Mountaineer,	Glencoe,	Clydesdale,	Lochiel,	Handa,	Mabel,	Gladiator,
Iona,	Grenadier,	Pioneer,	Claymore,	Lochawe,	Inveraray Castle,	Islay,	Lochness,	Udea,
Fusilier,	Gondolier,	Glengarry,	Clansman,	Linnet,	Cavalier,	Fingal,	Ethel,	

Sail during the season for Kyles of Bute, Ardrishaig, Oban, Ballachulish (for Glencoe), Fort-William, Banavie, Inverness, Staffa, Iona, Lochawe, Islay, Tobermory, Portree, Strone Ferry, Gairloch, Lochmarea, Ullapool, Lochinver, Lochinaddy, Tarbert (Harris), Stornoway, Thurso, Loch Katrine, Loch Lomond, the Trossachs, &c.; affording Tourists an opportunity of visiting the magnificent scenery of Glencoe, the Cuchulin Hills, Quirang, Loch Coruisk, Loch Scavaig, Lochmarea, the Falls of Foyers, and the famed Islands of Staffa and Iona. OFFICIAL GUIDE, 3d.; Illustrated, 6d.; Cloth Gift, 1s. Time Bill, with Map and Fares, Free by Post from the owner.

DAVID MACBRAYNE, 119, HOPE STREET, GLASGOW.

TEETH LIKE PEARLS

Produced by discarding cheap and gritty tooth powders and acid washes
which ruin the enamel, and by using daily

ROWLANDS' ODONTO

A pure, fragrant, and non-gritty Tooth Powder; it whitens the teeth,
prevents decay, and gives a pleasing fragrance to the breath.
Avoid imitations and ask Chemists for ROWLANDS' ODONTO.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

On the Ruby Mines near Mogok, Burma.

By ROBERT GORDON, C.E.

(Read at the Evening Meeting, February 27th, 1888.)

Map, p. 324.

WHEN Upper Burma was annexed to the Empire in 1886 negotiations were opened with commercial firms for the working of the ruby mines near Mogok, some 60 miles north of Mandalay. Among the competitors were Messrs. Streeter & Co., who were requested by the Government to send representatives to the mines, and I was asked to survey and report on the mining district by the concessionaires. Every facility was offered for the survey by the authorities;* and by the courtesy of Mr. E. W. Streeter, F.R.G.S., I am permitted to offer a brief account of that famous acquisition and to present the map to the Society.

2. This region, which has hitherto been closed to travellers, may now receive more attention, and a few words on the way to it will not be out of place. The weekly mail from London reaches Rangoon in twenty-three to twenty-five days; and direct steamers do the ocean route of about 8000 miles in thirty to forty days. Formerly the only route to Mandalay was the river journey of some 600 miles, which took two or three weeks to accomplish, owing to delays at intermediate stations for cargo; but now 160 miles of rail to Prome on the Irawadi cut off one-half the distance in a few hours, and express steamers run thrice weekly between Prome and Mandalay, in three days up and two down. This river route will always be attractive, owing to the scenery and the interest attaching to the river and to the places upon it. The down journey may often be made this way, when time is no object, even after the opening of the new railway far inland to the east, in 1889, which will enable the distance of 400 miles between Prome and Mandalay to be covered in less than twenty hours.

3. The river has often been described; and the comparatively unat-

* Beyond the kindly courtesies of General Stewart and his staff I am specially indebted to Captain Hubday, R.E., and to Mr. H. J. Richard, C.E., for the sketch maps made by them of the routes to the Ruby Mines.

tractive railway line is not without interest. It is bringing about economic changes of the highest importance. In 1864 I examined the country between Rangoon and Pegu for a road, and found the greater part uncultivated plains covered with trees or elephant grass. The remainder of the line to Tonghoo was long afterwards described as valueless jungle and swamp lands for a great portion of the distance. At present, 162 miles of railway are opened to Tonghoo and pass through rich cultivation and wild lands rapidly being reclaimed and transformed. The local traffic is already heavy, and with the through traffic to the Shan States more than pays for working.

4. It is a continuation of this line which is to reach Mandalay. The two valleys of the Sittang and of the Samone, a branch of the Myitgne, form a plain which rises only a few hundred feet above sea-level at the water-parting. In the southern valley there is a heavy rainfall and luxuriant vegetation; but the northern one comes within the area of comparative dryness and the dense forests of huge trees, with impenetrable undergrowth of creepers and tangled grass, give place to smaller tree and shrub jungle alternating with cactus and prickly pear and other thorny plants. The ground, however, is culturable; and the mountain streams from the high Shan plateau lands and mountains which rise steeply close to on the east, with the lower drainage basins of the Pegu Toma Hills on the west, have been admirably adapted to systems of irrigation in the plain lands. The plains near Kyouksay are amongst the most fertile in Burma. Projects are being considered for extending this irrigation scientifically under Government control, so that in a short time the entire railway may pass through a richly cultivated country with greatly increased local traffic, besides tapping the Shan trade routes, while it will have immense importance also in facilitating civil and military operations in Upper Burma.

5. Its chief interest, however, will lie in the fact that the new line forms the first instalment of the great iron highway for British commerce to South-western China in the near future. Valuable as the Irawadi route must always remain for heavy traffic the disadvantage of the slow steamer transit to Bhamo, which place, though only 800 miles from Rangoon, takes longer and is more costly for freight to reach than London, makes the extension of the railway to Bhamo indispensable for passengers and light traffic, which can then easily arrive in thirty hours to the frontier of China from Rangoon. A continuation of the railway within Chinese territory for 600 or 700 miles along the old trade route will reach Yunnan-Fu, the capital of Yunnan, and a further extension of the same length to Su-Chau-Fu and to Chung-King-Fu will place the principal marts of Sze-chuen and the navigable channel of the great artery of China, the Yang-tse-kiang, within 100 hours from Rangoon, with less than 2000 miles of railway, varying in cost from 6000*l.* to 10,000*l.* per mile, so that an expenditure of 14,000,000*l.*

sterling, of which 3,000,000*l.* has already been incurred, will bring Central China within twenty-six days' reach of London. The country to be passed over is easier than that crossed by the mountain lines of Colorado, and is in every part within territory subject to the direct authority of the Governments of India and of China.

6. From Mandalay to the Ruby Mines the river route is usually taken to Thabyetkin or Kyanyat. The latter place, situated nearly 90 miles up the river, being chosen as the base of the military expedition, I took steamer for there on the 15th December, 1886. Two flats were in tow, one of which carrying military stores and live-stock, struck a snag on the second morning, and was rapidly sinking, when she was run on a sandbank to save her. There all three vessels remained for four or five days, giving the passengers time to examine the Mingoon Pagoda, the greatest mass of brickwork in the world, with the immense bronze bell, reported to be the second largest existing, which are fully described and figured by Colonel Yule in his 'Mission to Ava.' We were warned that the neighbourhood was thick with dacoits, and we saw a party of the new Sikh police in pursuit of a gang, with two or three of whom they presently returned as prisoners. The dacoits had completely paralysed the boat traffic on the river, and parties of bluejackets from war ships in Rangoon were actively engaged in suppressing them. A few days afterwards, on the 9th January, Lieut. Macdonald, in charge of the bluejackets, was killed at Sheemagay, a short distance above where we were stranded. Although the steamer and flats only drew a little over $3\frac{1}{2}$ feet of water, the river was so low and the channels so bad, that all vessels passing had to be dragged over different bars by their cables, and it took our steamer twelve days to reach Kyanyat. It was not only the portion of channel between Mandalay and Bhamo that delayed traffic, as extensive bars formed near an acute bend of the river in the delta near Kyunghun, completely blocking the navigation for over three weeks in March and April 1887. During the present dry season of 1888 the river is reported to be worse than ever before known in this respect.

7. The Thabyetkin route crosses a low part of the Shwey-oo-doung Hills, a small isolated range running parallel to the river in the lower defile. It keeps throughout on high ground, entering the ruby region from the south near Kyatpyen, with 50 miles of river route and 40 by road. It has been chosen as the permanent road to the mines, and is now being much improved; but it was not open when I went up, so I followed the road just passed over by the expedition, which runs for 40 miles through plains partly subject to inundation in the rains, and for 20 to 25 miles in the hills. Extensive forests cover most of the lower country. Jungle fowl and partridge abound, but large game is rarely seen. Monkeys are abundant. When I passed, a telegraph line *

* This has since been given up.

was being hurriedly put up to connect with the troops, and the officer in charge pointed out a tree very widely prevalent which the coolies declared to be dangerous to cut down. Not only was its juice poisonous, causing painful sores on the skin, but its exhalations were said to be baneful, and, malevolent spirits guarded it. This region is fever-haunted. It caused much sickness to the troops and camp followers, both Burmese and natives of India. The fever-belt runs right through Burma, at the bases of the mountain ranges, in parts corresponding to the Terai of the Himalayas. The people from the lower plains seem more subject to the fever than those from the hills. One feature of the fever in this locality was that those who had suffered from fevers elsewhere seemed less liable to it than those who had never been affected before. Experience has shown that the new road on higher ground is also feverish, but when the approach is completed to the sanitarium lately established the bad parts can be rapidly passed through and the colder high grounds be quickly reached.

8. This sanitarium, called Bernard-Myo, after the first Chief Commissioner of the new province, is situated on the broad rolling plains of Enjouk, on the northern slopes of the hills bounding the mining districts. It stands at an elevation of over 6000 feet above sea-level. Colonel Cubitt, who commands the force in the Ruby Mine districts, has now lived in the Enjouk valley for several months, and writes that it is one of the healthiest sanitariums in India, or in the world. The road rises continuously to these plains from Sagatoung, generally through thick forest, from which most of the teak timber has been extracted. As the higher parts are reached magnificent views open out of the country below. In the early morning dense white fogs are apt to shut out the lower plains; but Shwey-ou-doung, whose conical peak, rising some 5000 feet above sea-level, has been the most conspicuous object coming up the river, stands out clear and distinct to the south-west. In the far distance westwards the Arracan Hills form a noble background to the Irawadi, whose generally straight course can be traced running north and south for many miles. As the mist disperses, the immense plains of forest land are seen below with a few isolated clearings of cultivated ground, showing what a scanty population there is. Immediately below, however, there is a small valley, with a north-easterly direction, where cultivation and houses appear more extensive and numerous; the lands belonging either to the Momeit Shans or to the ruby districts. Several small villages were passed on the way to Enjouk, nearly all deserted after the fighting; but I met some Chinese who had been settled in the neighbourhood for many years, and who returned to their homes when the troops went on. Should continuous residence prove Bernard-Myo to be in all respects favourable as a sanitarium it will be a great boon for Burma, which has hitherto been without a health resort.

9. The Enjouk plains are open, with few trees about; but to the east

risers a range of hills with blackened crests, and flanks covered with masses of dense forest, whose dark foliage gives the name of *Toung-Meh*, or dark mountain, to the most prominent peak. The road descends from *Bernard-Myo* to reascend to the pass over the ridge at about 6200 feet. It passes a curious barrier of rocks where the last stand was made against our troops. They form a row of obelisks some scores of feet high, and they are found in a similar row, but on a more extensive scale, in the next valley on the road to *Kathey*. They are of limestone, black outside from the weather, but, when broken, presenting a pure white fracture. This limestone appears to form the axis on which the gneissic rocks have been upheaved. It protrudes at various points, but its flanks are covered with the disintegrated metamorphic debris. Ferns abound in the damper nooks of the rocks and the trees, &c. The trees are often covered with orchids, some rare ones, and many of great beauty. The view is confined to the pathway until a considerable descent is made, when a charming scene suddenly opens out with the rolling wave-like hills beyond and the narrow valleys below.

10. Presently a streamlet is crossed, with artificial channels led from it to contour the hills, indicating irrigation or mining operations. It proves to be the latter, for though many similar channels are met with in several parts of these valleys, little cultivation by irrigation was seen. In the *Kachyen Hills* to the north irrigation is generally practised, the water being led to the rice-fields on the terraced hill-sides. The valley now entered is that of *Yay-Boo*, which occupies a central position relative to the *Mogok* and *Kathey* valleys. The ruby-bearing region, so far as known, lies within an area 10 miles long by five wide, and consists of groups of small valleys nestling beneath the *Toung-Meh* range, and to the south of it. The *Enjouk* valley to the north is said to yield rubies and sapphires, but they have not been regularly worked. The valleys arrange themselves into three groups of nearly equal area by the distribution of the watercourses. To the east a few streams unite to form the *Yay-Nee*, or red water, so called from the washings of red earth from the mines. This drains the *Mogok* valleys. The *Yay-Boo* stream meets the *Yay-Nee* a short distance below *Mogok*, with the drainage of several minor valleys constituting the *Yay-Boo* group. The *Kathey* and *Kyatpyen* valleys have separate streams, which do not join the *Yay-Nee* till they pass out of the ruby region, when they unite with other branches from *Mainlong* to form the *Madeeya* river, which enters the *Irawadi* just north of *Mandalay*. A road follows this river line from *Mandalay* to the mines, and if there were likely to be a very heavy local traffic, it might be worth while to develop it; but the present route is extremely rough and badly chosen, and passes through disturbed tracts of country.

11. I surveyed the principal roads in the valleys, fixing the positions of the peaks and principal villages. The heights are mostly taken from the military surveys. The valley plains range from about 4000 feet

near Mogok to 4800 near Kyatpyen, while the ranges vary from 6000 to 8000 feet in height. The main valleys offer fine views of bold scenery, backed by black mountain masses and dark forests, while the lower rolling grounds and steep hill-sides of brighter green are variegated with red and white landslips, indicating occasional heavy rainfalls. All the plains and lower slopes within easy reach of the villages have been denuded of trees for fuel, but the other parts are generally thickly wooded. Every prominent elevation of the lower hills is crowned with a conical-shaped pagoda, and the chief places are surrounded with smaller pagodas, richly carved monasteries and shrines, as well as with substantially built rest-houses for travellers or traders. Everything indicates the possession of surplus wealth and the liberality of the people. There is a condition of general wellbeing and comfort apparent in the houses and surroundings. The houses are of wood, of the Burmese type, with raised floors and mostly thatched roofs; but the colder climate requires them to be more solidly and compactly built than those in the lower plains. As a rule, they are surrounded by inclosures, often fenced with blush roses. The cultivation generally seemed very backward when compared with that of the Kachyens and Chinese Shans to the north, near Bhamo, where, with no greater fertility of soil, apples, pears, peaches, plums, and potatoes abound, as well as the more usual fruits and vegetables of the country. The amount of cultivation within the mining region is small and insufficient for the people, few as these are. But agricultural communities lying outside the territory have long been attached and subject to it.

12. Thus Mogok is shown, in an official document of the late Burmese Government, as containing 170 houses within the village itself, and over 260 houses in fourteen other villages in the Yay-Nee and Yay-Boo valleys, all within the mining districts; while outside these, in purely agricultural districts, there were seventeen villages with over 400 houses. None of the latter is shown on the map. Kyatpyen had ten villages with 160 houses concerned in mining, with six villages and 90 houses devoted to agriculture; the figures for Kathey being seventeen villages with 160 houses, and two villages with 100 houses respectively. Beyond this a floating population of traders and coolies exists near the principal places; but probably, with an average of five persons to each house, and outsiders, there may be a population of from 5000 to 6000 in the mining districts, with half as many more in the agricultural villages.

13. The most remarkable thing is the distinctness and diversity of races among the peoples in the different communities, who evidently have kept themselves from intermarriage with their neighbours for centuries, and a brief notice of the tribes whose types are found here may not be out of place. In Kathey, as the name implies, the villagers are Katheys, whose ancestors were brought as prisoners from Munnipore

very long ago, as they have lost both the Hindoo religion and their own language. In Mandalay, Prome, and Henzadah, where bodies of the same people have been long transplanted, they keep their race and religion pure still. The ethnologist would find matter of intense interest in the interactions of some of these races upon each other, and perhaps the history of these transplanted Katheys would yield the most curious results. When surveying for the railway in the district south of Mandalay, I found them extensively distributed throughout the country, always living separately in their own villages, and retaining many of their peculiar characteristics, even when they had become thoroughly Burmanised in their speech, religion, and general habits. They are colonies of pure Aryan race, retaining the features and colour and physique of their Indian ancestors, although surrounded for centuries by Turanians of great assimilating power, whose cordial hospitality and tolerance tend to modify and absorb most of the races coming into close contact with them. None of the yellow races of Burma, or Siam, or China, milk their cattle, and it is difficult when travelling in those regions to get a supply of this very useful article. Near Mandalay, and to the south of it, however, the Katheys have accustomed many of the Burmese to the use of milk, and it is perhaps the only part of Burma where it could be got in the country places. The Katheys are clever and industrious weavers, and they produce in Mandalay, and in several rows of villages on the lower part of the Myitgne river, very richly coloured and variegated silks, which cannot be imitated by machinery. When the whole of the Mandalay and Kyouksay districts were overrun with dacoits in 1886, almost the only villages which remained unburned were those belonging to Katheys on the Myitgne. These were strongly stockaded, not only at the outer village fences, but often from house to house, and were prepared to offer strong resistance to attack. It seemed at first sight as though their immunity depended on their peacefulness and on their keeping aloof from the quarrels of rival pretenders to the throne, and submission to the British; but a night attack and massacre of some twenty-seven armed police within five miles from Mandalay, early in 1886, was found to have originated in one of their villages, and there was reason to suppose that some of them were more loyal to the deposed dynasty than many of the Burmese.

14. In Bama and other villages at the mines the people are Paloungs, who keep up intercourse with the tea-growing Paloungs on the hills to the east, and preserve their language, although, like the Katheys, they have become Buddhists. Less is known of the Paloungs than of most of the great tribes bordering on Burma. They differ in speech, and claim to differ in origin from all their neighbours. They occupy a wedge-shaped territory of mountains and plateau between the Ruby Mines of Burma, the Shan States, and China; their principal State being called

Toung-baing, which has nominally been subject to Burma, but which, from its inaccessibility, has been practically independent. The chief last year refused to acknowledge British supremacy, but an expedition this year will probably bring about a formal submission. The region is known to the Burmese as the La-pet Toung, or Tea Mountains, as it is the part from which great supplies of tea in a dry or in a pickled state are brought. The Paloungs who cultivate it appear to be a quiet, unaggressive people; and they do not themselves bring their produce to the Burmese markets, but sell it to trading caravans of Shans and Panthays.

15. In Kyatpyen the people claim to be of pure Burmese stock. They dress, however, in Shan costume of blue or white trousers and jackets, which is very unusual for the Burmese, whose ordinary costume resembles the Scotch kilt. When the troops occupied the Ruby Mines the Kyatpyen people were the last to come back to their homes. Whether it was that they had taken more active share in the resistance, or had run away the farthest, is uncertain, but they offered the humoursome nonchalance peculiar to their countrymen on their return. As a rule the Burman dreads the cold hill-countries, and he makes a poor colonist to them, although his descent is derived from the Tibetans through the Kyin tribes of the western mountains.

16. In Mogok the permanent residents are all Shans, but Burmanised. As Prof. de Lacouperie has ably shown, the Shans are a portion of the aboriginal people of China, driven before the hordes of Chinese from the north to the southern regions. Under an apparent conformity to the surrounding conditions they become Burmese, or Chinese, or Siamese, as to dress and manners, and modes of life, and sometimes language; but they retain more than any of their neighbours their independence and individuality, presenting complex results which will make them one of the most interesting studies in the near future of Burma. They possess a power of organisation and of self-government which has enabled them to form themselves into clans and nations. At one time a Shan kingdom possessed Upper Burma, and even now Siam is a Shan nation, while most of the intermediate region between these countries and China is possessed by Shan clans and tribes. These seem to be incapable of acting together, and internecine warfare appears to have been rife for ages, without having been pushed to extremities. It may safely be predicted that any attempt to subject these scattered tribes and States to the hard-and-fast regulations of British rule will be attended with disastrous results, and will contrast unfavourably with the native and Chinese rule, which allowed them to govern themselves, electing their own chiefs from the hereditary families, and to settle any little difficulties amongst themselves by a free fight now and then.

17. Separate communities of pure Chinese and of Mahommedan Chinese are found as permanent or as temporary residents. I came

across Chinese agriculturists, and there are villages of Chinese who cultivate pork; but the genuine Chinaman is generally a trader or artisan when he is found in Burma. The Panthay Chinese are descendants of the Mahommedan immigrants from the West who settled in Yunnan centuries ago, and their longer features and more upright forms discriminate them from their neighbours. They are perhaps the greatest travellers on the face of the earth, if we may distinguish between those who are carried by trains or steamers and those who travel on their own feet. Every year numbers of these men come from Yunnan to Rangoon and Maulmein, doing thousands of miles on foot, with caravans of ponies, mules, or cattle, to exchange the productions of the country for the imported wares of Rangoon. The railway will relieve them of their long journeys; but as distributors of merchandise on the off lines they must long remain unrivalled. They are exceptionally well informed as to the geography of the countries they traverse, and details can be filled in to maps from their accurate descriptions of places and features. In 1868 Sir Edward Sladen led an expedition to open up trade with the Panthay kingdom which had then been established some years in Yunnan, and was most hospitably received. It is said that formerly some 70,000 mules used to come yearly from China to Mandalay alone. No definite information is now at hand as to the traffic generally, but it still continues to be immense, supplemented as it is by the Shan caravans from the Shan States and Tea Mountains to the numerous marts in the Burmese plains.

18. Beyond these principal peoples, we find in this small locality, attracted by its wealth and its markets, bodies of Mainthas and of Leesaws, who come as temporary visitors. Although the Kachyens are near neighbours to the north, the powerful Shan State of Momeit prevents their irruption in numbers to the Ruby Mines. The Mainthas are either Chinese Shans of a different type from the main body, or are hill Chinese from the North-eastern Chinese Shan States. They come in large bodies of heavy powerful men to do the hard work at the mines and on the roads; generally working as labourers in the dry season, and returning to their homes some hundreds of miles off in the rains. The Leesaws are hill-men of weaker physique, who occupy the mountain regions of Western Yunnan, and are found in isolated communities in the higher parts of the Northern Shan States. They are supposed to be of the same tribal origin as the Burmese, but to have been driven and kept in the more inhospitable hill tracts to the north. They bring firewood, and vegetables and other food, to the fairs held every five days in the principal villages of Mogok, Kyatpyen, and Kathey. The residents of the larger villages rarely do any heavy work at the mines themselves. They engage labourers, advancing them money and necessaries, and sometimes giving them a share of the profits, if any.

19. Careful inquiries were made regarding the rights of the people and

their relations to the old Burmese Government. Theoretically they had no rights of any kind. The monarch was the sole proprietor of the country by conquest, with the people tenants-at-will; but, practically, everything indicated considerate treatment and kindly relations. Their taxes were, however, just double those of other parts of Burma. Lessees of the Government had representatives at Mogok, at Kyatpyen, and at Kathey, and in them was vested the authority for collecting taxes. The communities kept order, and the isolation in which they lived made this easy. Although the custom seems to have been to engage mercenaries for any fighting, the difficulties of access and the facility of defence made them secure from attack except by powerful bodies. Most of the villages were stockaded, and in different parts small escarpments on the tops of low hills told of determined resistance to attack in former days. But all tended to show a settled and peaceable condition amongst the inhabitants in recent times, with a greater accumulation of wealth amongst the headmen than was possible elsewhere under the native rule. Bridges of a substantial character cross the streams, and roads made with much trouble and expense connected the villages to each other and with the outer world.

20. No permanent mining works of any value exist; but numerous artificial water-channels are carried with easy slopes on the hill-sides, the ravines being crossed by temporary aqueducts on bamboo framing. The mines are of three kinds: the first, which is of the least importance at present, but which may be the most valuable in the future, consists of workings in fissure veins of soft material which are found imbedded in the crevices of the hard rock caused by shrinkage in long past ages. It is probable that volcanic action accompanied the upheaval of these mountain ranges, and that the already formed rubies were thrown up with a matrix of complex structure since disintegrated by long weathering together with the metamorphic rocks clothing the skeleton of the old mountain limestone whose ribs still protrude. But there is no sign of any recent volcanic action in the neighbourhood; and the corundum is now found disturbed through the clay formed from the breaking down of the gneissic rocks, and also in layers or beds in the valley bottoms near the river, apparently discriminated and arranged by water action. The crevices in the older rocks give origin to cave mines, which are called "Loos," where the soft earth is excavated in a primitive fashion and on a small scale. Very little protective work is used, or regular passages made; the fissures being followed until falls of rock, or choke-damp, stop the way, when the mine is abandoned. An isolated pagoda-crowned rock just north of Mogok offered examples of such caves, now partially filled with earth again; and Pingu-toung, a steep hill overlooking Bama, is rich in such mines, which, however, are frequent through the valleys. At the latter place three men had recently been killed by the falling in of a mine; and again, in July

1887, three more were killed through a similar catastrophe. It is evidently desirable that scientific methods of mining should soon be introduced.

21. The second class of mine is called "Myaw," or washing, and corresponds, but on an insignificant scale, with the hydraulic mining in California. The water is conducted by the channels before mentioned to the lower hill-sides which consist usually of the softer remains of the secondary rocks in reddish or lighter coloured clays, containing rubies and sapphires, though few and far between. The clay is cut into thin slices with a gardener's spade, and washed from the funnel-shaped excavations through flumes or open timber channels, where the clay is dissolved away, or carefully examined for the stones. No attempt has been made to wash the hill-sides by water under pressure. The most extensive works of this kind are close to Mogok.

22. The third and, at present, the most important class of mines is found in the flatter lands of the valleys, where, whatever be the absolute height of the ground, or whether in the neighbourhood of Mogok, or Yay-Boo, or Kathey, or Kyatpyen, at depths varying from 10 to 30 feet, there is found a layer of corundum from a few inches to a few feet in thickness. It is difficult to account for the existence of this layer of nearly pure corundum lying on a bed of earth in which no stones are found, and covered by a similar layer of porous earth. Can geologists explain why for ages the water should have selected earth free from rubies, and then for a lengthened period have brought down and deposited nothing but ruby sand and stone, to again cover it up with common earth? Sir Edward Sladen informs me that in Arracan he found garnets similarly deposited in a layer eight inches thick, four feet from the surface, while the ground above and below it contained none. The corundum layer is generally free from any admixture of clayey earth, and when brought to the surface myriads of small rubies glitter in the sun. They are mostly too small to be valuable, and the mass undergoes careful search for the larger stones, which are selected and classified according to colour, size, and freedom from flaws. It is but rarely that a stone is found which proves to be satisfactory under all three heads. When once the corundum layer, called "Pyon," is extracted, the pits are abandoned to fall-in in the softer material, but to be permanent sources of danger where the ground is firm, as in the neighbourhood of Kyatpyen, where pits overgrown with weeds come close up to the footpaths. The earthy hummocks of the abandoned mines form a remarkable feature along all the principal watercourses of the lower parts of the valleys.

23. The ruby is rarely found in the crystal form; the stones, whether in the smaller grains or in the larger sizes, being water-worn or of irregular shapes, as though split up in contracting; and it is well known that it is extremely rare to find a ruby without a flaw in it. Good

stones of proper colour, nearly flawless, and ranging from three to five carats in weight, are very much more valuable than the best diamonds of the same weight. Beyond five carats in weight they are so rare in the best quality as to be of immense value. We hear of historical large diamonds, but large rubies of perfect colour and flawless are mythical. The extraordinary thing about this is that the sapphire is, so far as chemical analysis can show, identical in substance with the ruby (both being a carbonate of alumina), and it is found in the same neighbourhood with it, of small and large sizes, and good and bad colours, often free from flaws. Evidently the difference in constitution which causes the change of colour brings with it the shattering of the larger pieces of the ruby stones. A three-carat diamond of finest water is worth 150*l.*, but a good ruby of the same weight and quality is worth 1500*l.*; a five-carat diamond may be worth 300*l.* at the utmost, while a similar weight of ruby is worth 3000*l.*

24. It is premature to forecast the future of the Ruby Region, but with the careful handling which it is sure to receive from the new governing powers, we may fairly expect a rapid development of the mineral wealth, but would also hope that its exceptionally rich advantages of soil and climate may also be fully utilised to convert it into the garden of Burma.

NOTE.—Rainfall for the eleven months this year, sent by Mr. Streeter's agent from the mines, Mogok, as follows:—

RAINFALL DURING THE FOLLOWING MONTHS IN UPPER BURMA. 1887.

	inches.		inches.
January	2·30	July	20·87
February	0·	August	13·91
March	0·67	September	13·99
April	2·82	October	4·33
May	11·13	November	1·27
June	15·14		

Total for 11 months, 86·43 inches.

After the paper,

Mr. E. W. STREETER read some extracts from letters recently received from Mogok. On May 21st, 1887, Mr. Atlay wrote:—"In April, when mining first commenced, there were thirty licenses granted by the Chief-Commissioner, employing 346 miners.—It has rained every day for the last three weeks.—Cultivation here will be small this year, as a number of ploughing buffaloes were stolen some time ago by dacoits.—The servants are all down with fever, and the native doctor as well; he will probably soon be replaced. The Deputy-Commissioner is also down with fever, and will have to leave later." On September 3rd, 1887, he wrote:—"The amount of money received by the Indian Government from June, July, and August ruby sales was:—From Streeter's Syndicate, R.2915 = 194*l.* 6*s.* 8*d.*, and on rubies not bought by them, R.1882 = 125*l.* 9*s.* 4*d.* Eighty-three more licenses have now been granted in the three townships of Mogok, Kathey, and Kyatpyen, which employ

927 miners, and produce royalty to the Indian Government to the extent of R.2175 which, taking the rupee at 1s. 4d., equals 145%. In conclusion, Mr. Streeter stated that the Government, in not carrying out the concession entered into by Lord Dufferin, had lost in the year (pro rata) $3\frac{1}{2}$ lacs of rupees, equalling 37,500%. With great difficulty I have obtained the population of the three townships where mining is carried on, viz.: Mogok, 714 houses, containing 3392 inhabitants; Kathay, 405 houses, containing 1725 inhabitants; Kyatpyen, 302 houses, containing 1553 inhabitants. How many working miners there may be in this total of 6670 souls, I have no means of judging, but it must be something like this:—1000 to 1250 men, 1000 women, and 4000 children, out of whom there may be about 1200 able to work." The ruby probably owed its colour to the presence of some compound of chromium. It was generally of a carmine, cochineal, or rose-red colour, with a play of violet; but the most valuable was the colour of pigeon's blood. The two most important Indian-cut rubies lately seen in the English market weighed, one, after recutting in London, $38\frac{1}{2}$ carats, and was sold for 20,000*l.*; the other, also recut, weighed $32\frac{1}{2}$ carats, and was sold for 10,000*l.* These rubies were considered of so much importance in Burma, that they were escorted from the palace to the vessel by a military guard, and brought direct to London. The ruby of pigeon's-blood colour, when examined by the dichroscope, exhibited two tints, the one aurora-red and the other carmine. The composition of a ruby was pure alumina, with a minute trace of colouring matter. Its specific gravity was about 4, and its hardness 9, or slightly under. Its system of crystallisation was hexagonal; the common form being a double six-sided pyramid. The Burma sapphire differed somewhat from the sapphire found in Ceylon, Kashmere, Siam, and Australia. It was of a very dark and rich velvety blue, while the Ceylon sapphire was of a much lighter blue. Occasionally, however, a very fine stone was found in Ceylon, but it always had the distinctive mark of silk, either in or on it. The Kashmere sapphire was of a pure blue, somewhat of the colour of the corn-flower, sometimes of a dark velvety colour, but rarely without milky lines of silk. The Siam sapphire was of a dark, dull colour. The Australian sapphire was of no value. The Kashmere mines were worked by means of tunnels through the rocks; but in Siam sapphires were found in the alluvial soil. In Ceylon the stones were water-worn pebbles, found in the river beds. In Australia they were found in the tin mines. The sapphire was blue corundum, while the ruby was a red variety of the same species. The crystallisation was the same in both stones, and they were found under similar conditions, the only difference being that the ruby was mostly found in fragments, while the sapphire occurred in rolled crystals or pebbles. The spinel ruby was of less specific gravity, softer, and of a very small value. It also differed essentially in chemical and crystallographic characters, being an aluminate of magnesium, which occurred in regular octahedra. The finest rubies in Burma will have to be regularly mined for through tunnels into the rocks, and every caution will have to be used to prevent any repetition of the accidents mentioned by Mr. Gordon in his paper. Great care had also to be taken against choke-damp, and mining carried on in that way would require a very large capital. At present the Government would not permit machinery to be employed, nor would they even allow the use of dynamite.

The PRESIDENT said that the Indian Government considered that the native population, who had been working the ruby mines from time immemorial, were entitled to continue that form of industry; and before deciding as to the manner in which the mines should in future be worked a geologist would be sent to examine the country, and report as to the probabilities of the source from which the rubies were derived, and the most useful method of development. The Government were provisionally continuing the old system which existed under the late King of Burma.

The rubies were dug by the natives who were licensed. They were bound to bring the rubies to a Government officer, and a record was made of all the stones. The person who dug the ruby estimated its value. If the Government were satisfied with that valuation the digger had to pay one-third of the estimated value to the Government. If there was a dispute the Government officer had a right to put a price upon it, and if that were not accepted the ruby was sent down to Mandalay and sold by auction. Until some permanent arrangement was made Mr. Streeter had the right, on behalf of the Government, to get the stones on those terms. When the Government had satisfied itself as to what was the best way of dealing with the rubies, then possibly Mr. Streeter or somebody else might get a lease, but the intention of the Government was to do the best they could for those who desired to have rubies, and for the public revenue.

Mr. J. ANNAN BRYCE said that, as a matter of fact, scarcely anybody knew anything about the ruby mines of Burma, except Mr. Gordon and the few officers in charge there. In former days no one was allowed to go within fifty miles of them; and with the exception of the French Expedition, which had a commission from the King, no European, he believed, had been there until our troops in 1886. He had been surprised to hear what Mr. Streeter said with regard to the very small revenue derived from the mines, because the old Burmese Government managed to get a very much larger revenue, varying from 1 to 1½ lacs of rupees, for the right to pre-empt the rubies. One of those who had the pre-emption was afterwards in his (Mr. Bryce's) employ, and told him that he used to pay the King a lac of rupees a year, and yet made it pay very well. The King theoretically had the right to purchase at market value all the stones above four carats in weight, but as a matter of fact very few of those stones ever got to him, as he would never give the fair value. A great many found their way to the dealers, and those that reached the concessionaire came to the markets of Europe. In 1880, when there was a rebellion going on, he was at Mandalay, and a Burmese gentleman who had been at one time the concessionaire, took him, with immense precautions, up into the bath-room, far away from all the servants, and produced a small packet out of his betel box, in which were two fine rubies. One of them was ten carats. It had no internal flaw, and was of perfect shape, colour, and water, but it had a dint in the back, which injured the value of it. He said he had been offered 3500*l.* for it, but was afraid to sell it because it would be known and he would get into trouble, and therefore he had kept it for a great number of years. This stone eventually found its way to England, and afterwards to Calcutta, where he heard it was sold for something like 1200*l.* The purchaser thought he would improve it by taking out the dint, but the result was the stone lost most of its colour, and was reduced in value to about 800*l.* In those days the King, the concessionaire, and the villagers all managed to make a good thing out of the mines, so that no doubt when the Government allowed the introduction of proper machinery, both Mr. Streeter and the villagers would make a good thing out of it, as well as the Government.

Colonel Sir E. B. SLADEN said that the ruby mines, before the annexation of Upper Burma, had always been a sealed tract to European adventure and enterprise. While he resided in Burma, no European was ever allowed to enter the forbidden region. There were no actual prohibitory orders, but there was a well-known disinclination on the part of the Government, and that man's perceptions would indeed have been dull who attempted to explore the country and expected to return. It was the policy of the Burmese Government to conceal as far as possible from European eyes all appearances which would lead to a belief that Upper Burma was a rich country, which would well repay foreign conquest. Some years ago he said to the King, who was then in want of money, that if he made concessions

to trade with regard to the overland route between Burma and China, money would flow into his country in equal volume with the waters of the great Irawadi; but the King replied: "The money would come sure enough, but with it we should have a swarm of hungry European merchants and quarrelsome Indian natives, who would get into trouble with the people, and bring on complications which would eventually lead to the loss of my country. We would rather do without the money, and keep our country." As soon as disorganisation set in, consequent on misrule, French intrigue took root at Mandalay, to the utter exclusion of British interests. A French Consulate was established, and the Government was asked to make certain concessions to French syndicates, which, if granted, would have imposed ruinous losses and conditions on the English commercial status in Lower Burma. One of those conditions involved a monopoly by France of the Ruby Mines district. The concession of the mines was actually contemplated at that time, but the contract was not approved and ratified by the King, and consequently was null and void.

The PRESIDENT said that he had made one or two notes which threw a little light upon the earlier history of the rubies of Burma. As early as the 15th century this country was known to produce rubies. Tavernier, a jeweller, who visited India in the middle of the 17th century, refers to Burma as yielding stones worth not more than 100,000 crowns a year, and that it is difficult to meet with one of good quality weighing more than three or four carats, as the King kept all the larger. The largest stone of which any record seems to exist was 22 carats, and such stones are usually flawed. The revenue of the late King, derived from the ruby mines, is believed to have been about 12,500*l.* to 15,000*l.* Of the stones brought from Mandalay very few appear to be really valuable. It was premature to talk about the future of the mines. In conclusion, he returned the thanks of the meeting to Mr. Gordon for his extremely useful and interesting paper.

*Lectures on Geography, delivered before the University of Cambridge,
1888.*

By General R. STRACHEY, R.E., F.R.S., President, B.G.S.

LECTURE IV.

March 10th.

IN my previous lectures I have endeavoured to show how, under the action of inherent or external forces, the globe has been moulded to its present form, and has received the existing configuration of its surface; and how, from the action of similar forces on the atmosphere, have resulted all those local conditions and characteristics of climate, which have fitted it for the support of life. We thus find ourselves at the mysterious line which separates inorganic from organic matter.

Of the origin of life, either when or how it began, we know nothing; all that can be said is that the earlier conditions of the earth were altogether incompatible with life as we know it. For thousands of years, as the globe cooled down, its surface must have been deluged with boiling water; and until a temperature had been established not

very greatly exceeding the present, none of the forms of life found in the oldest fossiliferous rocks could have come into existence.

The sharp distinction between animal and vegetable formerly made is quite broken down; the bond that subsists between things with and things without life is testified by the identity of the elements of which they are all composed; and the only possible conclusion is that life is in its nature analogous to other properties of matter, though we are wholly ignorant what the connection between them is and how it is maintained, and that it is in fact in some unknown way a necessary attribute or consequence of matter in certain conditions.

Life is restricted to a very thin stratum on the earth's surface, quite insignificant in comparison to its total magnitude. The possibilities of life, its preservation, and the propagation of living things, are further seen to be everywhere directly influenced by all external conditions such as the nature of the medium necessary for existence, be it air or water; heat, moisture, and light; the periodical recurrence of the seasons and of days and nights; depth in the ocean; the character of the surface of the land, whether it be covered by vegetation or otherwise; the nature of the soil; the presence of other living creatures; and many others.

Scientific theories of life must be based on the study of the structure and distribution of existing plants and animals, and of the corresponding facts established in relation to past time by the aid of geology. We thence learn that all forms of life may be arranged in groups, which by their structural affinities are suggestive of natural relationships, and exhibit gradations of successively closer degrees of proximity. Thus we find at the outset the great primary divisions, so-called "Kingdoms," of Animals and Vegetables, having respectively certain common characteristics of organisation. Subordinate to these, various minor divisions or Sub-kingdoms have been established in like manner, such as Vertebrata or Mollusca among animals, and Monocotyledons or Dicotyledons among plants; and further, in succession, Classes, such as Mammals or Birds, then Families, and Genera, until we at length reach associations of individuals known to be related by descent from a common ancestor, to which are applied the collective name of Species. Viewing these in a reverse order, a series of allied Species will constitute a Genus, of allied Genera a Family, and so forth. We also see that the assemblages of living creatures found in countries adjoining and easily accessible to one another, and alike in climate, are similar; that as distances increase, and communication becomes less easy, and climate differs, a corresponding dissimilarity appears; and that great distance and complete separation are generally accompanied by great changes of forms. Distance in geological time has the same effect as distance in space; the further we go back into the past, the more different were the forms of life from what they now are. The abundance of forms of life (as distinguished

from number of individuals) is also found to vary greatly in different areas, and to be related to the existence, within or near the areas, of localities offering considerable variations of the conditions that chiefly affect life; to the accessibility of such areas to immigration from without; and to the local climate and conditions being compatible with such immigration.

Thus was presented the great problem of Life, in its infinite variety of forms, past and present; consisting of groups of animals and vegetables, manifestly connected among themselves, and one with another, by certain common features of organisation, and distributed over the globe in a manner no less plainly indicating a common origin. The question arose whether or not these phenomena could be accounted for without having recourse to any other means than that which direct observation shows to be alone capable of producing living creatures, namely, propagation by generation through descent from parent to offspring. The answer has been given in the affirmative by Darwin, to whom we are indebted for a theory of life analogous in its breadth and the genius it displays to the great conceptions of Newton. Darwin has shown how propagation by descent, which maintains the essential characters of hereditary likeness, accompanied by certain small variations in the offspring, would be followed, through the influence of external conditions, by the necessary preservation of some of the varieties to the exclusion of others, and how this would account for many of the facts observed, while inconsistent with none. To the preservation or destruction of forms by reason of favourable or unfavourable external conditions, he has applied the term Natural Selection, and thence has obtained a solution of the mystery of the structural affinities of the various forms of vegetable and animal life. He has thus also explained how it is that uniformity of conditions and facilities for diffusion over any area are found in connection with similarity of forms of life throughout the area, and how any break of continuity of conditions, or surface, or time, involves differences in forms of life. Great tracts like northern Europe and Asia, extending along the same parallels of latitude, not broken up by high mountains, are biologically one. Great mountain ranges like the Himalaya, great deserts and wide oceans, constitute impassable barriers. Isolated lands, like Madagascar, Australia, and oceanic islands, are dissociated in their life-forms from the great continents, in different degrees, which seem to connote the geological date at which they were severed from the large land areas; and it is significant that this dissociation in island forms is always accompanied by great depth in the intervening ocean. Analogous results are found in the seas. With the rapid variations of climate that occur on lofty mountains rising from tropical plains are developed numerous forms of life; on mountains ranging through many degrees of latitude, as in the New World, there is greater variety of life, corresponding to greater variety of climate, than on those

nearly following the same parallel as in the Old World. Extensive land areas appear requisite for the evolution and support of the larger forms of terrestrial life, while restricted areas are characterised by smaller forms and fewer of them.

The laws that govern the diffusion and limitation of vegetable and animal life are similar; but though some of the great natural provinces marked out on the earth's surface by characteristic assemblages of plants and animals, respectively, are more or less conterminous, no exact correlation has been established between them, the cause of which may no doubt be found in want of complete conformity in the operation of the laws of distribution on the two great divisions of living creatures.

Many apparent difficulties in accounting for the existing facts of distribution, are solved by a consideration of the many great changes that have taken place in the outlines of land and sea in past time. The data necessary for any complete solution of all the questions that arise are wanting, in consequence of our still very limited knowledge of the geology of many parts of the earth, and especially of extinct forms of life either lost or concealed beneath its surface. But every fresh fact discovered seems to strengthen the evidence of the general truth of Darwin's theory of evolution as to its essential factors.

The phenomena of which I have been speaking indicate, moreover, much more than a simple conformity of life to the conditions under which it subsists; for the conditions, in fact, have positively determined the forms that have been preserved, so that the directing forces which have been efficient in developing life as it exists from what went before, are those same successive external conditions, including the forms of both land and sea, and the character of the climate, which have already been shown to arise from the gradual modification of the material fabric of the globe as it slowly attained to its present state. In each succeeding epoch, and in each separate locality, the forms preserved and transmitted to the future were determined by the general conditions of surface at such time and place; and the aggregate of successive sets of conditions over the whole earth's surface has determined the entire series of forms which have existed in the past, and have survived till now.

Perfectly unbiassed evidence of the truth of this conclusion is found in the tendency that had been shown before Darwin's great generalisations to give weight to geographical distribution in systematic classification. And though it be true that classification should rest wholly on morphological considerations, yet the structural likeness among forms geographically associated is often so complete, while so many links in the chain of evolution have been lost for ever, or still have to be found, that, on the one hand, distribution may without objection furnish collateral aid in the details of systematic arrangement, and, on the other, structural resemblances among forms now dissociated may serve to

suggest changes of former geographical conditions of which no other evidence remains.

These conceptions of the dependence of animal and vegetable forms on the conditions of the earth in its successive stages lead to views of the significance of type (i.e. the general system of structure that characterises the various groups of organised beings) very different from those formerly held. In the light of evolution, type indicates nothing more than the direction given to the actual development of forms of life by the surface conditions of the earth; these conditions, through the preservation of those forms best suited to survive and flourish under them, have controlled the course of the production of living creatures by propagation through successive generations, leading from the past to the present. Beyond this there is no indication of any inherent or pre-arranged disposition towards a development of life deviating in any particular direction from that which follows the hereditary principle. It rather appears that the existing face of nature is the result of a succession of incidents, unimportant in themselves, which by some very slight alteration of local circumstances might have been turned in a different direction. For instance, a difference in the constitution or sequence of the substrata at some locality might have determined the elevation of mountains where a hollow filled by the sea was actually formed, or the converse, whereby the whole of the climatal and other conditions of a particular area would have been changed, and an entirely different impulse there given to the development of life.

But further, all that we see or know to have existed upon the earth has been controlled to its most minute details by the original constitution of the matter which was drawn together to form our planet. The character of all inorganic substances, as of all living creatures, is only consistent with the actual constitution and proportions of the various substances of which the earth is composed. Other proportions than those present in the constituents of the atmosphere would have required an entirely different organisation in all air-breathing animals, and probably in all plants. Any considerable difference in the quantity of water either in the sea or distributed as vapour, must have involved corresponding changes in the constitution of living creatures. Without oxygen, hydrogen, nitrogen, and carbon, what we term life would have been impossible. But such speculations need not be extended.

The doctrine of the dependence of life on external conditions includes life itself as an important concurrent agency in the general results observed. Thus, in order to supply the food and other requirements of animals, the presence of vegetables or other animals is necessary. To some animals, as well as to some plants, the shelter of forests or particular forms of vegetation is essential. Parasites need for their sustenance living plants and animals. The fertilisation and hence the propagation of plants is very commonly due to insects; and the infrequency of certain

forms of insect-life in some of the islands of the Pacific, is held by Wallace to be the true cause of a corresponding infrequency of flowering plants.

So, too, the reaction of organic matter on inorganic may be seen over the entire globe. The building up of coral-reefs; the laying out of many calcareous and siliceous deposits over the bed of the ocean; the action of vegetable life on the constituents of the atmosphere; the effects produced by vegetation in modifying the absorption and radiation of heat by the soil, and the conditions of moisture; show how vital forces actively affect the condition of the earth.

As life, viewed in one aspect, performs the function of sustaining life, so in another it works for its destruction. Among the latest results of science may be noticed those that trace, with certainty in many cases, and with much probability in others, particular forms of disease among insects and plants, as well as among the higher animals, to parasitical organisms; and show how these withdraw the necessary elements of healthy existence, and may at length lead to the total dissolution of the creature in which they are produced. Thus, like the forces that act on inorganic substances, life also follows the same incessant round of construction and destruction; it elaborates from the constituents of the earth and atmosphere new combinations of matter, soon to be again dissolved, thus restoring the elements on which its own renewal depends.

The divisions of the earth's surface now generally adopted by naturalists as best representing the regions characterised by groups of animals and plants with well-marked common features, will be found to be arranged round the globe, so as to conform roughly with the zones of equal temperature.

Thus the vegetation has been divided into three great provinces:—the *Northern*, occupying the northern hemisphere, in both the Old and New Worlds, as far as the tropic; the *Tropical*, embracing the regions between the tropics, exclusive of Australia; and the *Southern*, including Australia and the adjacent islands, and the temperate zones of South Africa and South America.

Zoologists have adopted somewhat different divisions, but they are, in their main characteristics, analogous to those just described. The groups usually accepted in our own country are as follows:—The *Palaearctic*, including Europe, with temperate Asia, and Africa north of the Sahara desert, and the *Nearctic*, extending over the corresponding parts of America; the *Ethiopian*, including Africa south of the Sahara and South Arabia, and the *Indian*, embracing India south of the Himalaya, South China, the Malay peninsula and islands; the *Neo-tropical*, extending from South Mexico, over South America and the West Indian Islands; and the *Australian*, including the continent of Australia and the neighbouring islands of the Pacific.

The opinion that life originated in the polar regions, where the

gradually cooling globe must first have reached a temperature in which it became possible, was, I believe, first expressed by Buffon. Speculations on such subjects must obviously be received with much reserve, but there are indications considered valid by competent authorities, that it was around the north polar area that both vegetable and animal life were first developed, and thence disseminated over the rest of the earth.

Within this area have been found representatives of all the principal known fossiliferous systems, containing the remains of plants and animals closely resembling the present inhabitants of far lower latitudes, and even of tropical climates. Thus in lat. 82° N. are to be seen Silurian rocks containing undoubted reef-building corals, such as now exist under the equator in water having a temperature from 70° to 85° F. Almost the same may be said of the remains of plants. In many localities within the arctic circle, in some cases reaching within 10° of the pole, have been found accumulations of the remains of deciduous trees, in all respects resembling those now seen in the warmer temperate regions.

It further seems to be an accepted opinion that even if the northern hemisphere be not the area in which both plants and animals were originated, and from which they have been diffused, it has at all events played a most important part in the evolution and distribution of new types; and there is abundant evidence to support the view that existing forms of life may be traced back to an origin in the north.

It is also inferred from the manner in which existing forms are distributed that there has been in past geological time a general migration from north to south, interrupted from time to time, and in various localities, by secular changes of temperature and climate, or by alterations in the boundaries of land and sea or the elevation of mountain ranges, and occasionally reversed in direction.

The glacial epoch of the Tertiary period, during the later portions of which great movements of the earth's crust occurred, without material changes in the relative positions of the chief masses of land, appears to be the event which has mainly determined the local characteristics of present forms of vegetable life, the pre-existing flora of large parts of the northern hemisphere having then been either wholly or partially destroyed by cold, or driven southwards into what are now regions of tropical heat. Through the effects of the change of climate that then occurred has also been explained the presence of plants of the Arctic regions on many of the highest mountains in distant parts of the world and even in the Antarctic area, to which their migration under existing terrestrial conditions would be impossible. Such plants might have travelled southward, as the cold in the north became more intense, along mountain ranges extending for great distances from north to south, such as the Rocky Mountains and Andes, or possibly other chains no longer existing. With the return of the warmer climate the relics of the Arctic vegetation might be left in isolated areas, where a suitable

temperature continued, as on the highest mountains and in the Antarctic regions. Such changes occurring at any time in the earth's history would have caused the then existing flora to be broken up and to be subjected to great modifications by successive migrations in alternating or varying directions; introducing tropical forms into what had been temperate areas and *vice versâ*.

Changes of temperature such as those of the glacial epoch, would appear to have had hardly less influence in modifying the fauna of large parts of the earth than the flora, though in consequence of the relatively far greater inability of the latter to escape from conditions of climate incompatible with their organisation, the present distribution of animals and the special characters of a local fauna may be more largely due on the one hand to former connections between adjacent areas which may no longer exist, and on the other to prolonged isolation or separation.

But while these are the influences which have determined the production and distribution of the existing types or forms of life, it is the actual conditions of the regions they inhabit that control their preservation, and their greater or less abundance, and indeed all that may be termed their relations with the earth and one another.

The amount and extent of the variations of the heat and moisture of the air and of the rainfall, the force and direction of the prevailing winds, and the nature of the surface, are among the essential conditions that determine the possibility of life, and it is therefore to geographical features and position that we must look for the dominant influences under which life in its various forms exists on the earth.

Under these influences the vegetation which clothes the land and fits it for the support of animal life, in turn appears as the almost impenetrable forest and undergrowths of the tropics; as the more open woods and glades of the temperate zone; as the herbage of the prairies, meadows, and plains that invite the herdsman, the shepherd, or the plough; dwindles here to a few dwarfed bushes scattered over a desert; is seen there as a few alpine plants seeking shelter among crevices in the rocks; and finally, before disappearing in the regions of eternal frost, is reduced to a few patches of lichen.

On the slopes of the great mountain ranges that rise from tropical heat to the regions of everlasting snow, the traveller as he ascends may find within the compass of a few days a compendium of the climate, and consequently of the vegetation of the entire globe.

Nowhere can such a display be better or more easily obtained than upon the Himalaya Mountains. The transition is abrupt from the well-cultivated plain of Northern India, with its fields of rice and millets, or golden-flowering mustard, to the dense umbrageous forests along their base, almost wholly composed of trees of tropical forms, but among which a few oaks and an elm are found, and which with a tangled growth of undershrubs and creepers, and adorned with epiphytal plants in profusion, give cover to

the elephant, rhinoceros, and tiger, and afford shelter to the peacock and a multitude of other gaily coloured birds. The glens are choked with gigantic grasses and feathering bamboos. Great forests cover the outer ranges of the chain, scandent palms spreading over the lofty trees, whose stems are splendidly furnished with the dark green foliage of climbing aroids; the ground beneath them is concealed under a rich growth of tree and other ferns, orchids and Scitamineæ, or broad-leaved plantains. With gradually increasing elevation and falling temperature, the character of the vegetation changes. More open woods of evergreen trees, typical of warm temperate climates, succeed, including rhododendrons, oaks, and laurels. Lofty pines cover the vast mountain slopes through many thousand feet of altitude in unbroken uniformity. Still ascending, are reached forests of deciduous trees of surpassing size and beauty, crowning the hill-tops and fringing the courses of the rivers, intermingled with many flowering shrubs and an abundant display of herbaceous plants, of which at the greater elevations the forms are for the most part allied to, or identical with those of Europe. The arboreous vegetation, the last members of which are commonly birches, pines, and junipers, usually ends at about 12,000 or 13,000 feet above the sea-level, the shrubby growths ascending a thousand feet higher. The alpine region is thus attained, where under the influence of the frequent showers that fall on the mountain slopes exposed to the south, the open pastures are adorned, during their short summer, with flowers of every hue and in the greatest profusion and luxuriance, including well-known European forms, such as gentian, primula, anemone, and ranunculus, and many others.

With increased elevation, and as the ranges are less directly exposed to the rain-bearing winds from the south, the climate becomes colder and drier, the vegetation more scanty, the forms fewer; and on reaching the border of Tibet at an elevation of 14,000 or 15,000 feet, where the atmospheric conditions are wholly changed, the aspect of the country is that of a desert, treeless and bare; as a rule, and excepting in the rare neighbourhood of water, not one-twentieth of the surface is clothed with vegetation, and such bushes as there are seldom rise to a greater height than one or two feet. On the Tibetan plateau, where the precipitation of moisture is confined to a few showers in the summer, and scanty falls of snow in the winter, the surface drainage frequently collects in salt lakes; and at these great elevations many salt plants are found, with species of wormwood, and assemblages of truly sea-shore plants, precisely such as may be seen together at any time on the coasts of the British Isles. The general character of the scanty vegetation is European, but combined with many Siberian forms, and several species are identical with those of the Arctic regions. With the semi-arctic climate of Tibet, corresponding northern forms of animal life also appear, such as the marmot, lagomys, and other burrowing animals, the ounce and the lynx.

The great open half-desert plateaus supply a suitable home for peculiar antelopes and troops of wild asses, and the more inaccessible mountain tracts afford shelter for several species of wild sheep.

Analogous to the modifications in the character of the vegetation observed in ascending to great elevations, are those which accompany changes of geographical position and conditions in crossing a great continent such as North America.

The portion of the North American continent lying along the 40th degree of latitude, and extending from the Atlantic to the 95th meridian west from Greenwich, over a distance of about 1200 miles, may be described as a great plain gradually rising from the sea-level to an elevation of about 1000 feet along its western border. From it rises, at about 200 or 300 miles from the coast, the Apalachian range of mountains, few of the summits of which exceed 5000 feet in elevation, and but a small portion reaches even 3000 feet. Along the eastern margin of this region there is a considerable rainfall, from 40 to 50 inches fairly distributed through the year, which is gradually reduced to about 35 inches on reaching the 95th meridian west. The Apalachian Mountains appear to have no important influence on the total annual rainfall, and the whole tract, before civilised man began to intrude on it, was covered with a vast primeval forest, probably the largest and richest in the temperate zones.

To the westward of the 95th meridian the rainfall rapidly diminishes, while the elevation of the plain increases, and accompanying this change the forest region ceases and that of the prairies begins. This extends over a distance of about 600 miles to the foot of the Rocky Mountains, where, at an elevation of between 5000 and 6000 feet, the rainfall is reduced below 15 inches. As the western margin of the great forest region is approached it is invaded by open grassy belts, which soon become dominant, and there is an abrupt and surprising passage into the prairies, which extend their bright green rolling undulations to an apparently boundless horizon, with nowhere a tree to be seen, excepting along the rivers whose distant courses are marked out by scattered lines of poplars.

The Rocky Mountains, which rise abruptly from the prairie, and whose highest summits, which reach about 14,000 feet above the sea-level, immediately overlook the eastern plains, constitute in truth the eastern escarpment of a great irregular tableland extending for a distance of 800 miles as far as the mountains of California, which, in like manner, there form its western flank. The average elevation of this plateau, the surface of which is much broken up, is probably not less than 6000 feet; considerable areas rise to upwards of 8000 feet, and detached portions, chiefly towards the eastern escarpment, reach from 10,000 to 12,000 feet. The rainfall over a large part of this region does not amount to five inches in the year.

The eastern slopes of the Rocky Mountains are covered with forest, but of a scanty character, except in sheltered valleys and on the higher ridges, where condensation is most considerable, and the vegetation—arboreous, shrubby, and herbaceous—is more vigorous. The forest is mainly composed of pines, and almost the only deciduous tree is a gregarious aspen, which forms almost impassable thickets.

A few miles beyond this more favoured region begins the great desert basin, of which the country round the Great Salt Lake City is typical, and on which the scanty surface drainage collects in salt lakes and pools. There is an almost complete absence of grassy sward, and the surface over very large areas is exclusively clothed with the shrubby sage-bush, *Artemisia*, and various saline plants, chiefly *Chenopods*, stretching as far as the eye can reach, in low detached clumps; the prevailing colour of these, a dull grey or olive-green, conveys no unsuitable impression of the dreary and inhospitable character of the country, which in its general aspect resembles in a marvellous degree those parts of the Tibetan plateau which are in like manner cut off from rain by the lofty ranges of the Himalaya.

The western border of this desert region is formed by the Sierra Nevada range of mountains, rising to elevations from 11,000 to 14,000 feet, its slopes descending to the Pacific, distant about 150 miles. On these abundant rain once more prevails, the treeless waste is replaced by a forest tract of incomparable grandeur. But the essential characters of the vegetation differ in a most conspicuous manner from those of the Atlantic forests. Large numbers of the most abundant trees of the east are absent, and the forests of the Pacific are chiefly made up of conifers, among which must be specially noticed the far-famed gigantic *Sequoia* found in the Yosemite Valley, known as *Wellingtonia* in English gardens. The age of the largest of these, which rise to the height of over 300 feet, with a girth of more than 100 feet at six feet above the ground, has been estimated to exceed 3000 years; their parentage probably goes back to the glacial epoch, or even to a more remote date, but the race is almost inevitably doomed to destruction by the advent of man. North of lat. 35°, under the influence of the equable coast temperature, the moist climate, and heavy rainfall, which rises to 80 inches in lat. 40°, a little to the north of San Francisco, forests such as these, of great magnificence and beauty, clothe the mountains that skirt the Pacific.

The distribution of life has been greatly disturbed by the occupation of large parts of the earth's surface by man, from which has followed the destruction of much of the primeval vegetation and animal life, and the introduction of foreign or modified forms by means of artificial methods of propagation and culture. But the various plants which man has thus substituted to supply the fibres for his clothing; the cereals, the sugarcane, grape-vine, tea, coffee, for food, and so forth, have their special

requirements of climate and soil, and the areas within which they can be profitably raised are well defined geographically.

The animal kingdom is as directly under the influence of the physical conditions of the earth's surface as the vegetable, and is no less certainly ruled by them. Every animal must yield to the necessities imposed upon it, through its dependence for food on the vegetable products of the earth, or on other animals fed on those products, and for the protection which vegetable life affords against foes and the pressure of climate. The terrestrial conditions which permit the growth of forest determine the presence of those animals, to meet the requirements of whose organisation tree vegetation is essential. Where open plains cease, the wild horse or ass, the camel and antelope, disappear. The most inaccessible crags on lofty mountains are the selected home of wild sheep and goats. Certain genera of mollusca can exist only within reach of the action of the waves of the sea. Other creatures are found exclusively in the lowest depths of the ocean. Such instances might be extended indefinitely.

In what I have thus far said I have not distinguished man from the rest of the animate world, in which he holds the most conspicuous place. The progress of knowledge has removed all reasonable doubt as to his relation with other living creatures. It is now established that man existed on the earth at a period vastly anterior to any of which we have records in history or tradition. He was the contemporary of many extinct mammalia at a time when the outlines of land and sea, and the conditions of climate over large parts of the earth, were wholly different from what they now are, and modern research has done much to show how our race has been advancing towards its present condition during a series of ages for the extent of which ordinary conceptions of time afford no suitable measure. The ancient monuments of Egypt, which take us back perhaps 7000 years from the present time, indicate that when they were erected the neighbouring countries were in a condition of civilisation not very greatly different from that which existed when they fell under the dominion of the Romans or Mahomedans hardly 1500 years ago; and the progress of the population towards that condition can hardly be accounted for otherwise than by prolonged gradual transformations, going back to times so far distant as to require a geological rather than an historical standard of reckoning. The facts thus brought to light have, in recent years, given a different direction to opinion as to the manner in which the great groups of mankind have become distributed over the areas where they are now found; and difficulties once considered insuperable become soluble when regarded in connection with the now ascertained extreme antiquity of the human race, and those great alterations of the outlines of land and sea which are shown to have been going on up to the very latest geological periods.

The better knowledge now acquired of the want of stability of forms of human speech has also had an important bearing on these same subjects. For the evidence of the modifications which the chief spoken languages have undergone during the historic period shows that there is probably no country in which the tongue in use a thousand years ago would be now intelligible, and in still more remote ages, in the absence of written language, the tendency to the production of diverging forms of speech must have been much greater. This leads to the conclusion that even a radical diversity of language need not imply difference of race, an inference fully supported by what is known of the languages of existing savage tribes.

There is still considerable disagreement among ethnologists, as to the groups in which the human race should be classed, and the explanation of apparent affinities in various parts of the earth. Everywhere, however, a distribution is to be found corresponding in its main features with that of other forms of life, following the geographical distribution of land and sea, and limited by local conditions of climate. The largest area is occupied by the Mongolian race, which extends over the greater part of Northern and Eastern Asia, and is supposed to have spread over the islands of the Pacific, and the entire continent of America. The European races, commonly called Caucasian, occupy Europe, the northern parts of Africa, and South-western Asia. The Negro races are peculiar to Africa south of the great desert, though with an apparently exceptional extension to some of the islands in the Indian Archipelago. The Australian continent is peopled by a distinct race, of which traces are thought to be found in Southern India, Arabia, and possibly Egypt. In our ignorance of the time and manner of the development of these different races no thoroughly satisfactory explanations have been given of their mutual relations, or of the peculiarities of their distribution, some of which have been attributed to the changes of the boundaries of land and sea known to have occurred, during, or subsequent to the geological period in which the earliest traces of man are found.

What were the steps through which primeval man passed in acquiring his present place in the advancing front of living creatures will probably never be more than matter for speculation; but there is no room to doubt that for this position he is indebted not to any special efforts of his own directed to such an end, but to the wonderful compelling forces of nature which, acting on some inherited capacity, have lifted him entirely without his knowledge, and almost without his participation, far above the animals of whom he is still one, though the only one able to see or consider what he is.

For the social habits essential to his progress, which he possessed even in his most primitive state, man is without question dependent on his quadrumanous ancestors, as he is for his form and other physical peculiarities. In his advance to civilisation he must have been in-

sensibly forced, by [the pressure of external circumstances, from his primeval condition, in which he derived his sustenance from fruits or roots, and wild animals, to pastoral and agricultural occupations. The requirements of a population gradually increasing in numbers could only be met by a supply of food more regular and more abundant than could be provided by the spontaneous produce of the earth or the chase. But the possibility of the change from the hunter to the shepherd or herdsman rested on the antecedent existence of animals suited to supply man with food, having gregarious habits, and fitted for domestication, such as sheep, goats, and horned cattle; for their support the social grasses were a necessary preliminary, and for the growth of these in sufficient abundance land naturally suitable for pasture was required. A further means of escape from man's growing difficulty in obtaining sufficient food was secured by aid of the cereal grasses, which supplied the means by which agriculture became the chief occupation of more civilised generations. Meanwhile, as these increased facilities for providing food were in turn overtaken by the growth of the population, new power to cope with the recurring difficulty had been gained through the invention of implements and weapons first of stone, and then of metal. Ultimately, the needful leisure was for the first time obtained for the cultivation of mechanical arts and of thought, when the earliest steps of civilisation had rendered the necessity for unremitting search after the means of supporting existence less pressing; and thus was broken down the chief barrier in the way of progress, and man was carried forward to the condition in which he now is. The needful protection against the foes of his constantly increasing race—the legions of hunger and disease, infinite in number, ever changing their mode of attack or springing up in new shapes—could only be attained by some fresh adaptation of his organisation to his wants, and this has taken the form of that development of intellect which has placed all other creatures at his feet and all the powers of nature in his hand. But the marvellous growth of his knowledge, and his acquisition of the power of applying to his use all that lies without him, differ in nothing but form or degree from the earlier steps in his advance.

And man, with all his special faculties and dispositions, still remains, in most respects, as directly dependent on the physical characteristics of the regions in which he dwells, as any other of the beings that possess the attribute of life. If, on one side, his ingenuity has enabled him to withstand the agencies which to other less sagacious animals were irresistible, and taught him how to wield them for his own purposes, yet on the other, while acquiring this power, he became physically more susceptible to their influences when they operate in a manner adverse to his well-being, and he is forced more completely than any other creature to shape his existence so as to conform to their inexorable sway.

Thus the progress of the human race towards civilisation has been controlled in all directions by the features and conditions of the earth's surface. The climate, temperature, and moisture, succession of the seasons, length of day and night, have gone far in determining the physical characteristics, the bodily strength, and the duration of life in various races; and as less direct consequences, and under the greater or less necessity for the exercise of forethought in providing against vicissitudes of existence, have been developed their several capacities, social and intellectual, their numbers, wealth, and power.

The habits, modes of life, and occupations of all communities are immediately dependent on the features of the land where they dwell. The presence of a soil suitable for cultivation was one of the first necessities for progress; it has always remained one of the chief factors in the wealth of nations, and carries with it an agricultural population with fixed habitations. The pastoral and nomadic life is associated with upland pastures, or plains on which the soil or climate can only provide scanty grazing grounds. The varying vegetable, animal, and mineral products of different lands and seas have supplied man with corresponding means of supplying his wants or adding to his enjoyments, and hence his occupations and industries have, in each case or locality, had imparted to them the direction best fitted to place him in possession of such objects of his desires. The neighbourhood of the sea gave birth to maritime pursuits, success in which largely depends on the character of the coasts, and the shelter afforded by their indentations. The distribution of mountain chains and valleys, of rivers and the basins they drain, the boundaries of land and sea, have controlled the extent of kingdoms, the intercourse between different countries, whether friendly or hostile, the routes of commerce; they have supplied or withheld facilities for migrations, and protection against invasion. Within the limits they fix, states have become consolidated.

The ingenuity of man has only partially overcome the restraints thus put upon him. The arts of civilisation have led to the transfer of the chief seats of his power from the warmer latitudes where existence is most easy, to colder climates where the conditions are more favourable to the continued exertion of his intelligence. To meet his demands, civilised man compels the earth to increase and vary its vegetable and animal produce by cultivation and domestication. He breaks into the store of minerals hid away below the surface and converts them into power. He turns night into day, and subdues the forces of heat and cold. He pierces the mountains; he spans the waters that stand in his path across the land, and cuts through the land that stands in his path across the waters. He makes the ocean a highway over which he rides, regardless of winds and waves, to pursue his ends in all parts of the earth, and to plant his colonies in distant countries; and thus uses an obstacle impassable to most living things, as the principal means of his

own migrations, and of supplying his constantly increasing wants and desires.

But with all his arts, man remains subject to the irresistible power of terrestrial conditions. History tells how, under the influence of causes that can be traced back to the material earth, the destinies of our race have been determined, nations have been born, have grown, have flourished, and have perished; for whether we call it mother-country or fatherland, the soil under our feet, as in the Greek fable, is the true source from which we draw our bodily, mental, and social strength.

The persistent efficacy of these influences is unmistakably shown by the little fundamental change that has taken place in the geographical areas within or around which the larger groups of human communities continue to be associated, notwithstanding the greatly varied political conditions to which they have been subject. This is illustrated in most of the States of Europe. The Chinese empire still extends to what are virtually its ancient limits, and maintains its sway over a vast tract in Central Asia. The local distribution of the several elements of the population of India remains what it has been for several thousand years. In the new world fresh nationalities have replaced those destroyed by the Spaniards in Mexico, Peru, and Chili. The immigrant population of the United States in North America appears to have established itself as the representative of the race that formerly spread over the same area. I cannot doubt that some of the political problems that have arisen in our own country at the present time will eventually be solved under the pressure of geographical necessity.

Nor are geographical influences on man limited to those of a material nature. The constant succession of new objects which greets him as he changes his place on the globe, excites in him an interest not awakened by scenes of long-continued familiarity, and is one of the most active agencies in arousing his desire for knowledge. Thus too are multiplied those fields of observation which are the true and only sources from which he draws his intelligence and originality; for the mind has no power of absolute production, but only of perception and comparison. It is the faculty of applying with rapidity and precision the thoughts suggested by external objects and their mutual relations, that constitutes originality and gives the means of invention.

This is as true of imagination as of reason; by the influence and study of external nature are formed and developed man's emotional, intellectual, and moral faculties. The emotions created in the mind by the vast extent of the ocean, its ever-moving surface, the broken outlines of land and sea, the richness and luxuriance of the vegetable clothing of the earth, the astonishing variety of animal forms, the many diverse races of men, the never-ceasing transformations of the clouds as they float overhead, the play of light and colour over the whole of these objects, the firmament set with stars, the unfathomable depths of space,

the large serenity of nature at rest, her overwhelming violence in convulsion—emotions thus created are the source of all our ideas of the beautiful and sublime.

A knowledge of the relations that subsist among living beings, which is a direct result of geographical discovery, shows us man's true place in nature; our intercourse with other races of men in other countries teaches those lessons needed to overthrow the narrow prejudices of class, colour, and opinion, which bred in isolated societies, and nourished with the pride that springs from ignorance, have too often led to crimes the more lamentable because perpetrated by men capable of the most exalted virtue.

In the review which I have thus attempted of the matters that in my judgment would be properly included in the geographical instruction to be undertaken by the University, it has been my aim to treat the subject with constant and almost exclusive reference to the necessary relation of all that is upon the earth with the features of the surface, which it is the fundamental business of geography to investigate and portray. A few words may, I think, be usefully added on the correlative aspect of the subject which regards geography as an art that supplies man, through a knowledge of the features of the surface and their dependent attributes, with practical guidance in the affairs of life, or the advancement of other branches of learning.

A very small amount of consideration will show how intimately the geographical features of a country are bound up with the interests connected with it, and how important is a knowledge of those features, and their accurate delineation in maps.

The occupation of the earth's surface from the elementary unit of the smallest field or humblest dwelling, to the gradually increasing area of the estate, the parish, the county, and the kingdom, and thence to the largest continent, can only be defined with precision by the aid of maps; and much in proportion as correct maps have been applied to this end, disputes and complications in relation to property and jurisdictions have been avoided. Most of the difficulties arising from the extremely artificial system which secures titles to land in this country, and from the chaotic distribution of local authorities extending over intersecting areas, would be removed, or would never have been created, if the commonest teachings of geography were respected. Many of the gravest differences that have arisen in modern times between England and foreign countries, have been due to the neglect of the most simple and obvious means of defining boundaries by aid of proper maps. I think I shall not be far wrong if I attribute these results to the absence of a rational system of teaching geography to those who become our legislators and statesmen.

I have already said sufficient of the necessity for accurate maps in navigation. To the soldier, no less than to the sailor, maps and the power

of making them, and understanding them rapidly and correctly, are essentials of the highest moment. The engineer is wholly dependent on exact representations of both the horizontal and vertical features of the surface in many of his most important operations, and not less on a proper knowledge of the climate, the rainfall and the natural productions, mineral, vegetable, and animal, of the countries in which he is called on to carry out those operations. The physician must be possessed of a corresponding knowledge of the places to which he sends his patients in search of health, and must discriminate between the characteristics of climate due to geographical position and elevation above the sea-level. To the trader geography supplies information as to the condition of foreign countries to which he sends his merchandise, or from which he draws the commodities in which he deals; it will indicate the most convenient routes for commerce, and open the way to new markets, and to fresh fields from which to obtain articles of utility or luxury. The emigrant seeks from geography direction to a country suited to his capacities and his constitution.

Geography furnishes the key by which to interpret many events of the past, and problems of the present, and supplies the rough materials from which to build up the great structure of natural science. Through its aid, moreover, an instrument of research, otherwise unattainable, may be to some extent provided for the study of physical phenomena. In dealing with many of these, no such control of conditions is within our power as that exercised in some branches of inquiry, whereby it is possible to verify conclusions by the aid of experiment, to vary the conditions of investigation at pleasure, and to draw inferences from the varying results under the changed conditions. But this want may be partly supplied, and a substitute obtained for the power of direct experiment, through observation of the effects produced by the physical forces of nature, under the varied conditions that follow variation of geographical position on the globe.

The application of geographical considerations to the study of meteorology, which led to the use of synoptic charts exhibiting the atmospheric conditions at a given moment over a considerable area, was the immediate cause of the great advance in the interpretation of changes of weather that has taken place during the last fifteen or twenty years. The accumulation of knowledge from various countries, of various forms of life, and of the different conditions under which they are found, could only have been obtained by means of geographical exploration, and it was this, without doubt, that rendered possible the remarkable generalisations of Darwin and Wallace, as to the origin and distribution of species.

I have now discharged the task that I undertook. It remains for the University to carry out in a manner worthy of its reputation, the objects which the appointment of a lecturer on geography was

designed to meet. The instruction given will doubtless supply all needful corrections of the views I have advanced (for I am conscious of very insufficient knowledge of many parts of the numerous subjects to which it was necessary for me to refer), and fill in the outlines beyond which it has been impossible for me to go; supplying illustrations of the particular relations of the geographical conditions of the various parts of the earth with the chief classes of phenomena which they control or influence, whether falling within the range of natural science, history, or the economical interests of man, and keeping constantly before the student, by suitable examples, the necessary interdependence of all that is seen or done on the earth.

I am confident that by these means the University may become instrumental both in providing teachers better qualified to diffuse sound geographical knowledge through all classes of our countrymen, and in training travellers better able to extend that knowledge; objects which are among the special aims alike of the University, and of the Society which I have the honour to represent.

*Mr. F. C. Selous's further Explorations in Matabele-land.**

Map, p. 324.

WE have received the following letter from Mr. Selous, giving some details of his latest journey through Matabele and Mashuna Land, and notes in explanation of the valuable map of the region which accompanied his letter and which we now publish:—

ZEERUST, MARICO, TRANSVAAL, *January 5th, 1888.*

I have just returned from a hunting trip in the Mashuna country with three English gentlemen—Messrs. J. A. Jameson (brother of the Mr. Jameson † who was out here in 1880), A. C. Fountaine, and F. Cooper. We have travelled over a large tract of country in search of game, and I have worked out a rough map of the whole country, based upon Mr. Baines's observations, which I have assumed to be correct, and including my previous journeys in Matabele-land. This map I now send you, hoping that it may be of use to the Society. I had a very good prismatic compass given me by Mr. Jameson, with which I took bearings wherever I could, but in some parts of the country it is impossible to do so, as there are no landmarks or hills of any kind. I have made the distance by my reckoning almost exactly the same as Mr. Baines between Lo Magondi's and Mount Wedza, and the error in the compass may account for the difference in the positions of places on his corrected map, and as I have found them by my compass bearings. I have taken

* *Vide* 'Proceedings R. G. S.,' 1881, pp. 169 and 352; 1883, p. 268; 1884, p. 284.

† Mr. James S. Jameson, who joined, as naturalist, Stanley's expedition for the relief of Emin Pasha.

the positions of Lo Magondi's town and Mount Wedza as they stand in Mr. Ravenstein's last map as my basis in that part of the country, and then filled up the country between; and as I have now travelled all that country by several different routes, I cannot think that I am very far wrong in the way I have marked down the courses of the various rivers.

We went again this year to the confluence of the Umfuli and Umnyati rivers, and came straight back from there by a native footpath to Lo Magondi's town. When Mr. Jameson and I reached the same spot in 1880 we travelled all along the bank of the river over a very rough country, and I overestimated the distance. This year, coming back as we did in a straight line on a native footpath, I was better able to estimate it, and have accordingly placed the junction further south, and more correctly I think than I did at first. With regard to Thaba Insimbi, there are two ranges of hills lying approximately as I have marked them. Mr. Baines, whose route lay to the west of the Machabe range, and then round up the Umfuli, and Lundaza and onward to Umtigessa's, *could only have seen the one range*—the more easterly. Let me here say that I always find the country exactly as Mr. Baines marks it *on his actual route*, but directly one gets off his line mistakes appear. As for Herr Mauch's routes, I can make nothing of them. Either he never travelled on some of them, or the whole face of the country has changed since he was there. For example, on Mr. Ravenstein's last map you will see, near the head of the Bembeesan river, a place called Tabuka's, by Mr. Baines, and some distance to the south of it a place called Muzigaguva, on one of Herr Mauch's routes. Now Madabuga (Tabuka) and Muzigaguva were two headmen of Mashuna villages, the said villages being close together, not half a mile apart. These people were destroyed by the Matabele in 1883. Indaima's kraal, another Mashuna headman, Herr Mauch has put on the wrong side of the watershed. The town stands near the river Tukwe, a tributary of the Lumti, and not on the Bembeesan, where Herr Mauch has placed it; the site of the town is the same now as it was forty years ago. The source of the Sebakwe is about where I have placed it too, about halfway between Sigaro and Umtigessa's. Father Law took an observation at Sigaro in 1880. We crossed the Sebakwe close to that place this year, and I rode up nearly to the source of the river on horseback—a long journey.

At Sincia, near the river Angwa, there is a very wonderful place. It is an immense circular hole, about 100 feet or more in depth, and 20 yards or more in diameter, at the bottom of which there is a lake or pool of water extending for 60 yards or so in an immense cavern, in under the rock. The water in this pool is of a most wonderful colour, a deep cobalt blue, but very clear, as one can see pebbles at the bottom at a great depth. There is a slanting shaft or tunnel running at an angle of about 45°, from a point about 100 yards from the top of the

hole, which strikes the bottom of the hole just at the edge of the water. We are inclined to think that all these excavations are the result of old gold workings, and that a vein of quartz has been worked out down the tunnel, and that eventually a spring was tapped, and that the water forming the subterranean lake, has welled up from below. If the whole thing is artificial, and the work of man, a truly extraordinary amount of labour must have been expended in this place. The natives have now built a stockaded town round this old working, or whatever it is, and go down the tunnel to draw water at the bottom. We went and bathed in it, swimming up the cavern to the other end of the pool. The water was quite warm. The rock on each side of the tunnel is covered with innumerable scores, which look as if they had been done with some kind of iron instrument. The natives have no tradition about this most curious place, but they have no traditions of any kind, not even about the large lemon and citron groves—the trees covered with fruit—which one finds in this part of the country.

Mr. Fountaine and myself climbed to the top of the most easterly, and, I think, highest peak of Mount Wedza, and found by the aneroid that it is 1750 feet from the base to the summit. The whole mountain is a mass of very rich ironstone, and we could take no compass bearings at all, as the compass would not work. I took the heights by my large aneroid all over the country, but I will not answer for their correctness. As a starting-point I took Kerr's altitude at our camp [on the Hanyame], 4050 feet, to be correct *

You will find that I have marked on the map all the rivers running westwards from the Matabele country into the Gwai (or Guay) somewhat differently from what they appear on the published maps. My authority is Mr. David Thomas, now dead, a son of the missionary Mr. E. M. Thomas. He made several hunting trips from his father's place, Shiloh, between Emhlangen and Gubuluwayo, to the Zambesi, and found the position and course of the rivers as I have marked them. When I came back from the Zambesi to Emhlangen early in 1878, I crossed the Rutopi (Utope) near its source, and thought that it probably ran into the Gwai, but from what David Thomas told me, I feel sure that it runs into the Sengwe.

I am now going to cross the Zambesi with my waggons at the junction of the Chobe and Zambesi, and intend to go up to the Barotse country, as I am tired of the region south of the Zambesi. I intend to spend a couple of years in the wilds, hunting and collecting, and shall then, I think, return to England.

CAPE TOWN, *January 27th*, 1888.

I have had three copies made here of my map by the Surveyor-General, Mr. de Smidt—one I have given to him, the second to the

* *Vide* 'Proceedings R. G. S.,' 1886, p. 68.

Governor, and the third I am sending to you, I myself keeping my original. I had another sheet which I wished to send you, with a second map made out according to my compass bearings, but somewhere between Klerksdorp and here it has got lost, having no doubt slipped out of the centre of the roll in the middle of which it was. If I have time when I get back to Klerksdorp, I will make out a second copy from my note-book and send you. The map I am now sending you is one of a country which is bound to be of great importance in the near future, for there is an alluvial gold-field of large extent and wonderful richness—I speak with some authority, as it has this year been roughly tested with really extraordinary results—backed by a country of great fertility, and watered most plentifully. However, please understand that my map is only a sketch-map, and lays no claim whatever to scientific accuracy. I believe it will be found by any one visiting the country to be a fairly correct map in a rough way, but that is all.

NOTE BY MR. TURNER.—Whilst engaged upon the accompanying map illustrating Mr. Selous's letter, it occurred to me that the following extract from a report by Lieut. E. A. Maund, published in Blue Book C. —4643, February 1886, with reference to the altered situations of Gubuluwayo and Inyati, which does not appear to have been referred to elsewhere (except in a new French gazetteer), might perhaps be appropriately introduced here, as explaining the discrepancies in the positions of these towns as shown in various recent maps of this region.

In describing the division of the Matabele country into four military territorial divisions, he states, on p. 115 :—" Each regiment on formation receives a kraal named after it. This is the only kind of Matabele town existing. These kraals are posted near water, and when they have destroyed the wood for miles round, or there is not sufficient water or pasture for the cattle, as they increase by pillage or breeding, then the kraal is burnt, and the regiment builds another in a fresh bit of country. A large kraal or town can occupy a place for about ten years. This will account for Inyati having removed from the place marked as such on the maps. Emhlangen is the name of the place [still retained for the station of the London Missionary Society], and the Inyati regimental kraal is now 50 miles to south-east of it, hence the name of the new site is for the time being Inyati; while Gubuluwayo is 18 miles north of the position it occupied four years ago."

This Blue Book includes several official reports, containing a considerable amount of geographical information and description of the tribes, with the capabilities of the soil, in the country to the west and north of the Transvaal, not otherwise available.

GEOGRAPHICAL EDUCATION IN TRAINING COLLEGES AND ELEMENTARY SCHOOLS.

THE following letter on the subject of the prizes offered by our Society for geographical proficiency to the students of Training Colleges, has been received by General Sir Beauchamp Walker, one of the delegates of the Council in connection with the recent examinations for the Society's prizes:—

“ EDUCATION DEPARTMENT, *Feb. 25, 1888.*

“ DEAR SIR BEAUCHAMP,

“ We have pleasure in fulfilling the promise made to you and to Sir Peter Lumsden in the course of our yesterday's interview.

“ We cordially appreciate the judgment and liberality displayed by the Council of the Royal Geographical Society in offering prizes for proficiency in geography to the Successful Candidates at the Certificate Examination; and we believe that the scheme will have an excellent effect both on the students in the Training Colleges, and on the professors and lecturers in those institutions.

“ As you are probably aware, the examinations for certificates are not competitive; and no prizes or honorary distinctions are awarded by the Department to the best candidates. All who pass become provisionally entitled to recognition as masters or mistresses of public elementary schools. It may interest you to learn that last year 1383 young men came up from 18 Training Colleges, of whom 534 passed in the First division, 698 in the Second, and 149 in the Third; and that at the same examination 1854 female students presented themselves from 26 Training Colleges, of whom 516 passed in the First Division, 1139 in the Second, and 189 in the Third. The Department does not prescribe books or methods, but publishes each year a syllabus indicating in general terms the scope and character of the Certificate Examination.

“ The subject of geography is for the most part taught with much care and intelligence in these 44 Colleges. The instruction is mainly oral, and is given in the form of lectures and conversations, supplemented by text-books, maps, apparatus, and books of reference. The maximum number of marks assigned at the annual examination to Geography is 75; and the papers which you saw yesterday were fair though not exceptional samples of good papers, to which marks ranging from 60 to 70 had been awarded. If it be borne in mind that the average marks attained by the whole 3000 students lie between 45 and 55, you will be able to form a fair estimate of the general level of success reached in the teaching of this subject.

“ Having regard to the number and variety of the subjects necessarily included in the Training College course, and to the importance of allotting a due share of time and attention to each of them, your Council will probably agree with us in thinking that the object of the prizes offered by the Society should not be to claim additional and disproportioned effort on behalf of the one study of Geography, but rather to give honourable recognition to the exertions of the best students and teachers of that subject, and to keep before them a high standard of excellence, in regard both to the knowledge of Geography and to the methods of imparting that knowledge in elementary schools.

“ In considering how this object may best be attained, it has occurred to us that some slight modifications may be desirable in the proposals of the Society, as they were at first formulated in the letter of General Strachey, addressed to this Department on the 15th of March last. Any suggestion, however, on this point may be properly reserved for the present. After some experience of the working of the plan,

and after learning the views of some of the Principals and Lecturers, at our visits to the Colleges during the present year, we may probably feel at liberty to communicate to the Council some further observations.

"It will greatly add to the value of the whole scheme if, besides the 'G' which the Education Department proposes to affix in the Class Lists to the names of the prize-winners, the Society will publish those names in its own report, and will add the designation of the Colleges at which the students have been trained.

"It will probably interest you to look at the documents appended to this letter, and to learn from them what is the character of the instruction in Geography already prescribed by this Department for scholars in elementary schools and for their teachers. You are doubtless aware of the general purpose of these papers. The *Code* defines the legal conditions under which grants in aid are made to school-managers. The *Instructions to Inspectors* contain directions as to the manner in which schools are to be examined; and indicate generally the spirit in which the requirements of the *Code* are to be interpreted. The *Syllabus* describes in general outline the course of instruction to be pursued in the Training Colleges.

"We have marked the passages most likely to interest the Council of the Geographical Society. They are:—

"(a) The 'Schedule of Class-Subjects' (*Code*, pp. 20–21), showing a graduated course of geographical instruction for scholars in elementary schools from about the 8th to the 14th year.

'Standard 1.—To explain a plan of the school and playground. The four cardinal points. The meaning and use of a map.

'Standard 2.—The size and shape of the world. Geographical terms simply explained, and illustrated by reference to the map of England. Physical geography of hills and rivers.

'Standard 3.—Physical and political geography of England, with special knowledge of the district in which the school is situated.

'Standard 4.—Physical and political geography of the British Isles, and of British North America or Australasia, with knowledge of their productions.

'Standard 5.—Geography of Europe, physical and political. Latitude and longitude. Day and night. The seasons.

'Standard 6.—Geography of the world generally, and especially of the British colonies and dependencies. Interchange of productions. Circumstances which determine climate.

'Standard 7.—The ocean. Currents and tides. General arrangement of the planetary system. The phases of the moon.'

"(b) The 'Pupil-teacher Schedule' (*Code*, pp. 26–27), showing the requirements under the head of Geography for each of the four years of apprenticeship, usually from the age of 14 to 18.

' *First year.*

'The British Islands, Australia, and British North America. Physical geography of mountains and rivers. (Maps to be drawn in this and the following years.)

Second year.

'Europe and British India.

'Latitude and longitude.

'Climate and productions of the British possessions.

Third year.

'Asia and Africa.

'Winds and ocean currents.

Fourth year.

- 'The world generally.
- 'The seasons, the sun, moon, and planetary system.
- 'The tides.'

"(c) The 'Syllabus' for students in Training Colleges and other candidates for certificates, showing the course of instruction for two years, generally from the age of 19 to 21.

'First year.

- 'I. Elementary knowledge of Physical Geography, with special reference to :—
 - (a) Shape, size, and motions of the earth.
 - (b) The atmosphere, rain, clouds, and vapour.
 - (c) Winds, currents, and tides.
 - (d) Causes which affect climate.
 - (e) Effect of climate on industry, productions, and national character.
 - (f) Distribution of plants and animals.
- 'II. General Geography of the British Isles and the Continent of Europe.
- 'Sketch-maps, such as should be drawn by a teacher in the illustration of lessons, may be required of the British Isles, France, and Italy, *and the courses of the Rhine, the Rhone, and the Danube.*

Second year.

- 'I. The Geography, Physical, Political, and Commercial, of the British Empire.
- 'II. Sketch-maps of the principal British colonies and dependencies.'

"(d) The 'Instructions' (paragraphs 38 and 40), explaining the mode of testing the knowledge of Geography, and suggesting the most suitable method of teaching it.

- 'The Code recognises as the means of instruction in geography and elementary science, reading books, oral lessons, and visible illustrations. But it does not prescribe the exact proportions in which these means shall be employed for each standard, and for each subject. Those proportions should be determined partly by the special plans and aptitude of the teacher, and partly by other considerations.
- 'To obtain the mark "good" for geography, the scholars in Standard V. and upwards should be required to have prepared three maps, one of which, selected by the inspector, should be drawn from memory on the day of inspection. Geographical teaching is sometimes too much restricted to the pointing out of places on a map, and to the enumeration of such details as the names of rivers, towns, capes, and political divisions. It is hardly necessary to say that geography, if taught to good purpose, includes also a description of the physical aspects of the countries, and seeks to establish some associations between the names of places and those historical, social, or industrial facts which alone make the names of places worth remembering. It is especially desirable in your examination of the fourth and higher standards, that attention should be called to the English colonies and their productions, government, and resources, and to those climatic and other conditions which render our distant possessions suitable fields for emigration and for honourable enterprise. In order that the conditions laid down for the geographical teaching of the lower classes may be fulfilled, good maps, both of the county and of the parish or immediate neighbourhood in which the school is situated, should be affixed to the walls, and the exact distances

of a few near and familiar places should be known. It is useful to mark on the floor of the schoolroom the meridian line, in order that the points of the compass should be known in relation to the school itself, as well as on a map.*

"It only remains to add, that we shall be happy to co-operate with your Council, by making from time to time the needful revision and reports, and that we shall watch with much interest and sympathy the working of the Society's new and useful experiment.

"We are, dear Sir Beauchamp,

"Very truly yours,

"H. E. OAKELEY,	} <i>H.M. Inspectors of</i> <i>Training Colleges.</i>
"J. G. FITCH,	

"General Sir C. Beauchamp Walker, K.C.B."

GEOGRAPHICAL NOTES.

Award of the Royal Medals and other Distinctions for the Year 1888.—The Council, at their meeting of the 23rd ult., awarded the annual honours as follows:—The **FOUNDER'S MEDAL** to Mr. CLEMENTS R. MARKHAM, on his retirement from the Honorary Secretaryship of the Society after twenty-five years' service, and in acknowledgment of the value of his numerous contributions to geographical literature during the last thirty-five years, and his merits as an active explorer in the Eastern Andes and in Abyssinia. The **PATRON'S MEDAL** to Lieutenant H. WISSMANN, in recognition of his great achievements as an explorer in Central Africa, which he has twice crossed from sea to sea, and especially for the arduous and adventurous journey in which he traced the river Kassai from its upper waters to its previously unknown junction with the Congo. The **MURCHISON GRANT** to Mr. J. M'CARTHY, Superintendent of Surveys in Siam, for his excellent map of Siam, published in the Society's 'Proceedings' for March 1888. The **CUTHBERT-PEEK GRANT** to Major FESTING, for his services as a cartographer on the Gambia river and the country in the neighbourhood of Sierra Leone. The **GILL MEMORIAL** to Mr. CHARLES M. DOUGHTY, for his important work on Arabia, and the map of the country. The three Honorary Corresponding Fellowships of the year were awarded to Dr. G. RADDE, of Tiflis; Dr. H. RINK, of Copenhagen; and Dr. REIN, of Bonn.

Lieutenant Van Gèle's Exploration of the Mobangi.—The 'Mouvement Géographique' of April 22nd contains interesting details, from Lient. Van Gèle's own narrative, of his recent ascent of the Mobangi, a telegraphic report of which was announced in our April number. It will be remembered that the Rev. G. Grenfell was turned back in 1884 in N. lat. 4° 20', by the rapids of Zongo. Lient. Van Gèle, with a large party, left Equator Station in the steamer *En Avant* on October 27th, 1887, and reached the foot of the Zongo rapids on November 21st. These rapids are six in number, extending over a distance of 24 miles, and it took the party twenty days to surmount them. At the first

rapid the steamer had to be unloaded and dismounted, and dragged up by a strong cable. The second rapid is about 18 miles above the first, and is caused by a rocky bar across the river. At the left bank there is a passage with about five feet of depth at high water, and this the *En Avant* succeeded in navigating. At the third, or Belly rapid, the river contracts to 1300 feet, but there are depths of 50 feet, with comparatively slow current. The rapid is easily passed, and above the river expands to a breadth of 6400 feet, studded with islands and rocks. Three and a half miles further on the waters of the river are contracted by two rocky points; but the steamer passed the rapid after being unloaded. Again the river expands, and its bed is covered with a multitude of islands, rocks, rapids, and little falls. The fifth obstacle consists of a group of islands connected together and with both banks by a rocky bar forming rapids and two falls of extreme violence. This indeed was the most formidable of all the rapids, and the *En Avant* had to be both dismounted and unloaded before she could be got through. Lieut. Van Gèle named this the Elephant rapid. The last or Mukuangai rapid was easily passed; the river is here 6700 feet wide, with numerous islands and rocks. The two banks of the river along the rapids Lieut. Van Gèle describes as very fine. They are bordered with mountains of gentle slope, among which woods, meadows, maize fields, and banana plantations alternate. The flanks of the hills are studded with villages; the ground seems extremely fertile, and at several places the grass reached a height of 22 feet. The villages on the river-bank are palisaded in front, and in the cotton-trees watch-posts were established. As far as the middle of the cataracts (Belly) the people were of the same type; head shaved except at the nape, fierce-looking moustaches, and warlike aspect. But everywhere they received the explorers in a friendly manner. Above Belly a new people, the Bakombe, form the population, extending far into the interior between the Mobangi and the Congo. They are distinguished from their neighbours by the arrangement of their hair, which extends behind in queues, sometimes seven feet long. At Mukuangai the river comes from the north-east free from all obstacles, and the view is described as superb. It has a breadth of about 2700 feet and a mean depth of 14 feet. After about 22 miles it bends round to the eastward, and maintains this direction as far as Lieut. Van Gèle went, over a distance of 172 miles. Along this stretch it receives the name of Dua from the natives. On the right bank the mountains disappear, the left bank being marked by hillocks, among which grassy plains alternate with woods. The villages are built away from the river, but the *En Avant* was almost constantly surrounded by crowds of canoes full of friendly natives. Food of all kinds seemed abundant; all sorts of tropical products were offered for sale, besides goats, sheep, and fowls. The people on the right bank belong to the Buraka and Maduru tribes,

those on the left to the Bakangi, Mombati, and Banzy. They shave the head so as to leave a little triangle of hair on the forehead; their ears are enormously enlarged with copper rings or cylinders of wood. The river broadens and is covered with islands, mostly inhabited and cultivated. The huts are cone-shaped, resting on a wall of stone about two feet high. They are neatly arranged in rows forming broad streets, around a central building used as a common meeting-place. Iron is wrought ingeniously into all sorts of implements, weapons, and ornaments; but though ivory is abundant, it is used only for artistically turned bracelets, anklets, and lip-ornaments, or *pélélé*. About 130 miles above the Zongo rapids, at the residence of Bemay, chief of the Banzy, a second rapid was met with, which was passed on the left bank. About 25 miles further east is a third rapid, at which the *En Avant* had to be unloaded. About 12 miles above this rapid ($21^{\circ} 30' \text{ E. long.}$) the Bangasso discharges into the right bank of the Mobangi, the only tributary met with from the Zongo rapids upwards. Above this difficulties began. The Mom-bongo and Yakoma inhabit both banks, and these proved so decidedly hostile to the expedition that fighting ensued, and much blood, unfortunately, was shed, on the side of the natives at least. The navigation was obstructed by rocks and sandbanks, and so Lieut. Van Gèle decided to turn back after reaching $21^{\circ} 55' \text{ E. long.}$ The country here is densely populated on both sides, one village on the river-side being three miles long. The river here is 7800 feet wide, studded with islands, the larger of which are inhabited. As Dr. Junker, coming from the opposite direction, reached $22^{\circ} 55' \text{ E. long.}$ on the Welle, the distance between his farthest and Van Gèle's is only one degree. Both points are in $4^{\circ} 20' \text{ N. lat.}$ Thus there can be little doubt of the identity of the Welle and the Mobangi. As the water had fallen 10 feet the *En Avant* was navigated with some difficulty down the river, but safely reached Equator Station on Feb. 1st.

Rumoured Death of Mr. W. Montagu Kerr, the African Explorer.—We are glad to hear that the announcement of the death of this ardent and enterprising traveller, on his way home from Zanzibar, is incorrect. After the publication of the narrative of his journey of 1883–4 overland from Cape Town to Lake Nyassa, he had entertained more than one bold project of crossing the north-central part of Africa, and eventually decided on a route from Zanzibar round the north-eastern side of Victoria Nyanza to Emin Pasha's headquarters on the Nile, and thence to the Benue and Niger. To carry this into execution, he left England last summer for East Africa, but had hardly organised his expedition, and commenced his march into the interior, when he was stricken down by illness and obliged hastily to quit the coast for a more northerly climate. He lies ill now at Hyères, in the south of France.

Further Explorations of the Solomon Islands.—Mr. C. M. Woodford, the successful naturalist-explorer of the Solomon Islands, is about to

leave England on a third visit to the group. After spending some time in various parts of the islands not previously visited, he will investigate Santa Cruz, Woodlark Island, and other islands lying to the south-east of New Guinea.

New Britain.—Admiral von Schleinitz, who has recently been actively engaged in exploring German territory in New Guinea, has also made during the latter part of last year two voyages along the coast of the island of New Britain. The ‘*Nachrichten über Kaiser Wilhelms-Land*’ (1888 No. 1) gives a short account of these journeys, the results of which will modify existing maps in some important particulars. The southern coast-line, which is bordered by a fairly extensive plain, is very inaccurately charted, while the supposed islands of Willaumez, Raoul, and du Faure are only peninsulas connected with the main island. Several large rivers, which are navigable for some miles into the interior by steamers of considerable draught, have been discovered.

Birds’ Nest, or Elephant Islands.—Part i. of vol. xxi. of the Records of the Geological Survey of India, furnishes some information concerning this remarkable group, called by the Burmans *Ye-ei-gnet-thaik* (lit. Sea-birds’ nests), which is located on the south-east of Dumel Island, one of the largest of that chain forming the Mergui Archipelago at the southern extreme of Burma. It is a small group of six marble rocks, the highest and largest of which, 1000 feet in altitude, and about one mile in length, is oval shaped, and rises very abruptly out of a depth of only five fathoms. The sides are partly clothed with vegetation, wherever a break in the limestone has left a cleft in which moisture and dust can lodge. Conspicuous because of its looming altitude is a species of tree-fern which grows at any angle, but only above a height of 200 feet from the water. The face of the rocks is reddish, partly from weather and partly from soil, and where cliffs exist the most beautiful stalactitic formation is at work. But the great feature of the group are the bird’s-nest caverns, which, as a rule, open into the sea, the entrance being below high-water mark. At half-tide a tunnel opens under a wall of rock at the head of a deep cove in the big island; this tunnel has a roof-covering with large stalactitic knobs. Passing through this one emerges into another circular basin with perpendicular sides, which gives the impression of volcanic action, so like is it to a crater. Great caverns opening into circular basins exist in other parts of the island, and Commander Alfred Carpenter, R.N., who writes the account, states that the impression gradually forces itself on one, that these circular basins were at one time the floors of huge caverns, and that in days gone by the islands were far higher, with cavern piled on cavern, and that the work of disintegration by moisture is slowly going on, pulling down these marble monuments of a giant age.

Explorations of the Khin-gan Mountains.—This mountain range, which divides Mongolia from Manchuria, has been recently explored by M. Garnak, a Russian traveller, who has traversed the range four times, and explored it throughout almost its whole length. He started from Kalgan and proceeded in the first instance to Dolon-nor, whence he penetrated into the heart of the mountains before crossing them the first time. He then returned to the plateau of Eastern Mongolia and traversed it parallel to the Khin-gan as far as Dalai-nor. From the convent of Darkhan-Sume, M. Garnak directed his steps eastwards and crossed the range for the third time, and then followed its eastern slope to the territory of the Solons and Dahurs. This part of the country is hilly and covered with immense forests. Travelling was very arduous, but notwithstanding this, M. Garnak, after marching several hundred miles, again penetrated to the central ridge of the Khin-gan, and made his way over the range to the little town of Khailar, whence he eventually reached the province of Trans-Baikal. Throughout his long wanderings the traveller executed surveys with the compass, while his brother, who accompanied him, collected natural history specimens.—Another Russian traveller, M. Ressine, has visited the same part of Central Asia, and explored the basin of the Upper Liao-ho, as well as the desert extending between that river and the Nonni-ula along the eastern slope of the Khin-gan. These explorations, supplementing those of MM. Krapotkine and Fritsche, have given us a good general knowledge of the Khin-gan mountains.

Population of Turkistan.—The following figures as to the population of Russian and non-Russian Turkistan are taken from the most recent work on the subject by M. Kostenko. The dates of the various acquisitions of Russia in this region are also given.

Date of Acquisition.		District.	Population.
Russian Turkistan ; portions acquired in	{	Total extent belonging to Russia in 1867	1,059,214
		Zarafshan	200,000
		Kuhistan	31,468
		Delta of Oxus (right bank)	109,585
		Transcaspian territory	50,200
		Namangan	127,216
		Ferghana, Alai, and Pamir	602,245
		Akkal Tekke	32,000
		Part of Kulja	56,720
		{	Merv, Tejend, Attok, Yolotan, Sarakhs	117,000
Penjdeh			
			2,365,648
Non-Russian Turkistan	{	Khanate of Khiva	400,000
		" Bokhara	2,000,000
		Afghan territory	642,000
			3,042,000
Total ..			5,407,648

The Coal-fields of South Russia.—A Report (No. 87) on this subject has been drawn up by Mr. W. G. Wagstaff, our Consul at Taganrog, and published by the Foreign Office. The Report deals with the great Donetz coal-basin, which lies between the rivers Don and Dnieper, and forms one of the five great coal-fields of European Russia. Its area is 10,550 square miles, and it contains 200 collieries. The rapid development of the Donetz coal industry is very striking, and taking into account the mineral resources, and the foundries and ironworks established in this part of the country, the writer is of opinion that this district is destined to become the chief industrial centre of Russia, and that the manufacturing activity at present displayed in the north will, as the population increases, be transformed to the south. The annual output of mineral fuel from the Donetz Basin at the present time exceeds 1,612,900 tons, and the estimated amount for this year is 2,908,225 tons. The Report goes into detail with respect to the various leading collieries and their prospects.

Trade in Algeria.—The Annual Report (No. 291) for 1887 of our Consul, Sir Lambert Playfair, on the Commerce of Algeria, has recently been published. Speaking of the progress of the colony, in connection with the proposal for a Colonial Budget, the report says, "The colony, which 57 years ago was almost waste land, has now nearly 9,000,000 acres under cultivation, of which 190,000 acres are in vines; the agricultural material in daily use is estimated to be worth 1,000,000*l.*; 220,000 French, and as many foreigners of European origin are settled in the Tell. The exports amount to 8,000,000*l.*; there is a daily service of steamers to France; 1250 miles of railway are in working order, and profound peace exists everywhere. It is felt that the time has at length arrived for Algeria to be emancipated, to some extent at least, from the leading-strings in which it has so long been held, and which so seriously restrain its prosperity and prevent its expansion." One of the most important industries in the colony is the exportation of sheep and wool; the returns for the latter show an increase of over 150 per cent. during the last two years, but the number of sheep exported has varied as follows:—1885, 768,564; 1886, 578,835, and 1887, 641,789. The steady decrease in cereals exported is regarded as a matter of very serious moment for the colony. In the item of wheat, which is by far the most important, the fall in two years is nearly 100 per cent., the colony being unable to compete with India. The exports of fruit, especially grapes, tobacco, and olive oil, show satisfactory increase. The only mineral of any importance exported is iron ore. The figure for 1887 is 37,351 tons, as against 50,143 in 1886, and 39,780 in 1885. Wine promises, according to the report, to be the great resource of the colony, if only phylloxera can be avoided. In 1885, 6,618,942 gallons were exported, while in 1887 the figure rose to 17,498,712 gallons.

A Journey to the North Cape of Iceland.—Under this title M. Thoroddsen, the Iceland geologist, contributes to the current number of Petermann's 'Mitteilungen' a detailed account of his exploration of the north-western peninsula of Iceland, to which we have before briefly referred.* The stretch of coast from Trekyllisvík to the North Cape, which is known locally as the "Horn Coast," is probably the least known part of Iceland, no scientific traveller or tourist having visited it since Eggert Olafsson explored a portion of it more than one hundred years ago. The whole north-west of Iceland forms a tableland, its broken character being due partly to erosion and partly perhaps to "shrinking." Its summit averages a little over 2000 feet in height, but its slope down to the fjords is very abrupt, and in some places almost perpendicular. After exploring Breidhíffjörð during July 1886, M. Thoroddsen started from Kleifar on 2nd August and rode across the watershed down into the Mókoll valley. Lake Krossa, which was passed on the way, is not so long as represented on existing maps. He commenced his journey along the coast from Kolla Fjörð, and stopped for some days at each fjörð in order to collect botanical and geological specimens. All along the coast of the north-west, important traces of a displacement of the shore-line to the extent of from 130 to 160 feet are to be seen. At nearly every fjörð there are distinct terraces, in some places composed of loose material, in others hollowed out by the surf from the solid rock. These terraces, together with caves and the ancient shore-lines, are now high above the sea. Banks of shells of molluscs, identical with those still found by the sea-shore, and skeletons of the whale and walrus have been discovered here and there in places high above the present shore. Some of the native "sagas" speak of an elevation within historical time. Steingrímsfjörð appears to have been formed by a sinking of the land; this is also the case with Breidhi Bay, which is however of later origin. Proceeding northwards the coast becomes indescribably wild. During an excursion up the Kaldbak valley the traveller came upon some frozen specimens of ferns (*Aspidium lonchitis*, *Cystopteris fragilis*, *Polypodium vulgare*) in a depression which was free from snow. In the vicinity some water spurting from small openings in the basalt showed a temperature of 160° F. On the 16th August, after some arduous climbing, Reykjarfjörð was reached. The mountain scenery in the neighbourhood of this fjörð is described by the traveller as the most magnificent and imposing in Iceland. From this point he made several excursions into the surrounding fjords and country, including one to Drangar. On his way to the latter place he crossed the river Eyvindara, which flows through two small lakes, not marked on the maps, into the fjörð of the same name. The rocky coast of the fjörð shows many signs of the "scouring" of the ice and of glacial action. On its shores a plant, viz. the *Lathyrus maritimus*, which

* 'R. G. S. Proceedings,' 1886, p. 789.

is seldom found in Iceland, grows in clumps. Masses of driftwood, principally pine-wood, are found all along this coast; at every fjord the shore for some distance from the sea is covered with trunks of trees. He also spent two days in exploring the hot springs to the north of Reykjarfjord and a glacier which slopes down from the Drangajökull. The latter is much smaller than represented on Gunnlaugsson's map; it does not extend so far to the south. Like most of the Iceland glaciers it is a long, dome-shaped glacier mass. Its elevation is 2920 feet, and its present area about 30 square miles, whereas at one time it was 60 square miles. From his journey of July M. Thoroddsen was able to prove that the Glamujökull glacier, which once measured 165 square miles, has similarly shrunk to one-half its former size. From the Drangajökull four glaciers extend to the east and slope down the following fjords:—1st, the most southerly to Bjarnarfjord, terminating at about 800 feet above the sea; 2nd, to Reykjarfjord, terminating at 120 feet; 3rd, to Tharalaturfjord, terminating at about 450 feet; 4th, to Furufjord, terminating at 750 feet. From measurements made at the end of the Reykjarfjord glacier, the traveller found that during the last fifty years it has retreated about 1600 yards, its movement having been quicker in recent years.—On the 25th August M. Thoroddsen left Reykjarfjord on his journey to the North Cape. The most toilsome part of the journey now commenced. The difficulties of the ground, coupled with the bad weather, caused progress to be very slow. The horses required constant assistance, and had great difficulty in following the steep narrow path along the edge of the cliffs. Rain fell incessantly in the valleys and snow on the mountains. Under these circumstances the ascent of the great Drangajökull glacier had to be abandoned. From Furufjord to the North Cape the coast is formed by a stretch of basaltic rock from 1300 to 1600 feet high, with deeply eroded grass-covered valleys, some of which are inhabited. The farms lie high above the sea-level, and the people live principally by catching the birds which abound here in great numbers. Even in summer a ship rarely appears on the horizon, while during the greater part of the year the coast is blocked by the ice. The people are completely cut off from the rest of the world. On the evening of the 26th the traveller reached the Horn Mountain (North Cape), which is 1660 feet high. The country had quite a wintry appearance, being covered with snow; the thermometer stood at 36° F. The Horn Mountain is the highest and largest nesting-place in Iceland; the birds flock there in enormous numbers. They are principally the *Uria troile*, *Larus tridactylus*, and *Alca torda*. In consequence of the continuous snowstorm the traveller was unable to return along the same route, and also unable to take his horses across the hills to Isafjardardjup on the west coast; the latter being the route by which he had intended to return. He therefore killed the horses and set out on foot to the last-mentioned place. The

return journey was accomplished more quickly than he anticipated, and on 15th September he was again at Reykjavik. The weather throughout the whole journey was most unfavourable; it rained and snowed incessantly. Drift ice lay firm all along the coast, which was shrouded in cold, wet, white clouds.—We learn further that during last summer M. Thoroddsen made an exploration of the west coast of the north-western peninsula, especially of Isafjord, which, as we have stated above, he was prevented from carrying out in the previous summer. Besides this, he studied the surtur-brand deposits and the older and more recent glacial formations; he spent some considerable time on the northern glaciers of the Drangajökull. After exhaustive inquiry and examination he is able to state that all the glaciers of the north-west have retreated since 1840–50. This agrees to some extent with the phenomena observed in the Alps.

Rainfall west of the Mississippi.—General A. W. Greely, U.S. Chief Signal Officer, gave to the Washington Philosophical Society, at its meeting of February 18th, the partial results of a study he is now engaged upon, of the rainfall in the trans-Mississippi region. He said that the idea that there is any part of western America that is absolutely rainless is now a banished myth. During the past ten years, the number of stations for observation has been doubled, and the result of charting the observations has been to reduce very greatly the areas of small rainfall. The area in which the annual precipitation was supposed to be less than five inches has almost disappeared, and that in which rainfall was put down at less than 15 inches, has been reduced by a quarter of a million of square miles since the census map of 1880. General Greely discussed the question of what constitutes an arid region, and said that he does not agree with Major Powell who placed the minimum amount of precipitation necessary for successful agriculture at 20 inches per annum. He said that millions of bushels of wheat are raised every year where the rainfall is less than 20 inches, and referred to the statistics of Dakota, where more than 2,600,000 bushels were raised in two counties in 1885, and 1,500,000 in 1887, with an average rainfall of 13·7 to 15·1 inches. General Greely also mentioned the interesting fact that while the rainfall increases, as the rivers which flow directly into the Gulf of Mexico or into the Pacific Ocean are followed up from their mouths, it increases with the distance from the mouths of such as empty into other bodies of water, like the Colorado. General Greely's charts also prove, according to *Science*, that much of the rainfall in what has been known as the arid region, and where it was formerly supposed that the precipitation was five inches or less, was not reported. In some of these places the actual rainfall is as much as 16 inches, and in one it is 37. This is held to explain why water is found so abundantly in wells in some parts of southern California, where the annual rainfall has been reported as 10, 12, and 13 inches, the actual precipitation being

24 inches. He explained that the small average of rainfall formerly reported was due in part to the fact that so large a number of stations had been situated along the line of the Pacific Railway, which, seeking low gradients, had been built through a section of the country in which the precipitation was small. General Greely, moreover, thinks that the prevalent opinion that the rainfall in the west is increasing, is correct.

Dr. von den Steinen's Expedition to the Xingu River.—The progress of this second expedition of Dr. R. v. den Steinen, which we have already announced as having started,* has been interrupted owing to the advance of the rainy season, which prevented the continuance of the river journey. The party left Cuyabá, its base of operations, at the beginning of August last, and a month later arrived on the Kuliseo, the most eastern arm of the Xingu, which it was the special object of the expedition to explore. A camp having been formed, the voyage up stream was continued until 19th November, when as the high level of the water made fishing impossible, it was deemed advisable to return. The party was again at Cuyabá on the 31st December, whence they will start towards the end of the season of the rains. A survey of the hitherto unknown part of the Kuliseo was executed.

Togo-land, West Africa.—The German Protectorate in Togo-land has been considerably extended as the result of a journey to the north-west, which was accomplished during the months of August and September last by Dr. Henrici and Herr Grade. The two travellers started from Bagida, and then, crossing the Togo Lake to Gbome, passed through the district of Tove, Agotime, and Agome, and reached at length the mountains of Agome. They then crossed the range, the highest peak of which is the Königberg (7550 feet), and proceeded along the northern slope to the north-east. Having returned by way of Dsugbe to the south side of the mountains, they marched back to Little Popo on the coast, by a route a little more to the east than that usually followed. An excellent map of the country, embodying the results of this excursion and all the most recent surveys, has been published. The German Protectorate in this region now extends northwards as far as the Agome range, and at one point even beyond this.

CORRESPONDENCE.

To the Editor of the 'Proceedings of the Royal Geographical Society.'

ELTHAM, April 19th.

SIR,—I notice that in Mr. Holme's paper on the interior of Labrador, published in the 'Proceedings' for April, he states (Note 2, p. 198) the height of the Falls of the Zambesi at 100 feet. Mr. Holme evidently alludes to the Victoria Falls

* 'R. G. S. Proceedings,' 1887, p. 193.

discovered by Dr. Livingstone; the height attributed to these falls by the discoverer, Mr. Baines, Mr. Mohr, and other travellers who have visited them, is from 350 to 400 feet; the width of the river at the brink of the falls is 1860 yards. Amongst waterfalls combining great volume of water and great height may be named the Garsoppa Falls, in Western Hindostan, the river being 300 yards broad and falling vertically 830 feet, and the Kaieteur Fall of the Potaro river, in British Guiana, discovered by Mr. Barrington Brown in 1870, 123 yards in breadth, with a sheer plunge of 741 feet. The Yosemite Falls are in three leaps—of 1600 feet (vertical), 634 feet (cascades), and 400 feet (vertical)—but the stream when swollen by melting snows is only 30 feet across at the lip, and virtually ceases to flow in late autumn. It appears to me that it is impossible, without actual inspection of the falls themselves, to form any estimate of the Grand Falls of the Grand or Hamilton river referred to by Mr. Holme. The fall from a height at all approaching 2000 feet of a river 500 yards in width a short distance higher up would form one of the wonders of the world, and would surely have been described by Mr. Maclean after returning from his visit in 1839.

After examining the map of Labrador published with the paper, it occurs to me to suggest whether a more practicable route to the Grand Falls might not be obtained by following up the Moisie river from the Gulf of St. Lawrence and skirting the eastern shores of Lake Aswanipi.

Yours faithfully,

ARTHUR G. GUILLEMAND.

REPORT OF THE EVENING MEETINGS, SESSION 1887-8.

Ninth Meeting, 26th March, 1888.—General R. STRACHEY, R.E., F.R.S.,
President, in the Chair.

PRESENTATIONS.—*Louis G. Letord, Esq.*

ELECTIONS.—*Edward S. Cocks, Esq.; George Pollard Devey, Esq.; John Michael Finnerty, Esq.; Henry Norton Sullivan, Esq.*

The paper read was:—

“Exploration of the Solomon Islands.” By C. M. Woodford, Esq. Will be published in the June number of the ‘Proceedings.’

Tenth Meeting, 23rd April, 1888.—General R. STRACHEY, R.E., F.R.S.,
President, in the Chair.

PRESENTATION.—*Henry Norton Sullivan, Esq.*

ELECTIONS.—*James Robert Browne, Esq.; Dr. John Davies; Joseph Henry Granville, Esq.; H. C. Erhardt, Esq.; Rev. Robert Henry Moor; General Sir Donald Stewart, G.C.B.; Captain John Strachan; John Terry, Esq.*

The papers read were:—

“Unexplored Basuto Land.” By Lieut.-Colonel Sir Marshall Clarke, K.C.M.G. (H.M. Commissioner for Basuto Land).

“The Expedition to Fernando do Noronha of 1887.” By Rev. T. S. Lea, M.A. Will be published in a subsequent number of the ‘Proceedings.’

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

Gerard, E.—*The Land Beyond the Forest; Facts, Figures, and Fancies from Transylvania.* London, Blackwood & Sons, 1888: 2 vols.; vol. i. pp. xii. and 340; vol. ii. pp. viii. and 370. Price 25s. [Presented by the Publisher.]

Mrs. Gerard has written a book full of interest about a country which, though so near us, our ignorance is great. She is the wife of an Austrian officer, who was stationed in Transylvania in 1883-5, and therefore she had unusual opportunities of becoming acquainted with country and people. There is not much about the geography of Transylvania, but the most copious details about all the various types of people that compose the population of this meeting-ground of races. The map is not equal to the book; the execution is certainly good, but it is really a map of Hungary with Transylvania added.

ASIA.

Carles, William Richard.—*Life in Corea.* With illustrations and map. London, Macmillan & Co., 1888: 8vo., pp. xiv. and 317. Price 12s. 6d. [Presented by the Publishers.]

In this book the author describes the two journeys he undertook in Korea at greater length than he did in his lecture read before the Society on January 25th, 1886. In his first journey in 1883 he visited the mining country between Soul and Gen-san. His second was made the following year, and extended over more than one thousand miles. Leaving the capital, he travelled in a north-westerly direction to the mouth of the Am-nok; then along that river for 180 miles to Wi-won; thence eastwards for 120 miles to Chang-jin; and thence south to Gen-san on the east coast, and so back to Soul. Much of the country he traversed was hilly and well timbered. Pine, fir, oak, maple, lime, alder, hornbeam, birch, poplar, and mountain-ash abounded; and the author speaks of the vast quantities of timber floated down the Am-nok from the interior. Korea is well supplied with rivers, but appears to be absolutely destitute of lakes—the only approach to one that the author met with being a small piece of water about 200 yards long, near the east coast, between An-byon and Ko-san. Gold is found in many places, but the government prohibit the working of it, being anxious to husband the natural resources of the country against a time of need: in the same way that the extremely rich lode of the silver mine at Freiberg, in Saxony, is kept closed by an iron door that is only unlocked when the output of the other workings falls below a certain standard. The book is well illustrated by a map, two plates taken from photographs, and by 36 woodcuts, 30 of which are reproductions of most spirited and lifelike native drawings.

Chantre, Ernest.—*Recherches Anthropologiques dans le Caucase*, par Ernest Chantre, Sous-Directeur du Muséum de Lyon, chargé de Missions Scientifiques dans l'Asie Occidentale, par M. le Ministre de l'Instruction Publique, 1879-1881. Paris, C. Reinwald, 1885-7: 5 vols. 4to., pp. (T. i.) xxxvi. and 93; (T. ii.) 226; (T. iii.) 136; (T. iv.) 284. Price 12l.

The object of this very important work is to collect all the information that can be gathered from past literature, or the recent travels, researches, and speculations of men of science with regard to the populations of the Caucasus from prehistoric ages up to the present day. The work is divided into five volumes, one of which is entirely occupied by plates. The text is contained in the remaining four, which are also profusely supplied with illustrations.

The preface contains in its foot-notes a very useful Caucasian bibliography, which may direct the curious to many remote sources of information, though it is not complete with regard to modern English works (e. g. Captain Telfer's

'Crimea and Trans-Caucasia' is omitted.) The introduction which follows includes a sketch of the history of the Caucasian isthmus from the earliest times. M. Chantre's scheme, in the main body of his work, is as follows:—(Vol. I.) Prehistoric Period: Ages of Stone and Bronze; (Vol. II.) Protohistoric Period: First Age of Iron; (Vol. III.) Modern Period: Scytho-Byzantine and Persian Epochs, Middle Ages; (Vol. IV.) Existing Populations.

In the following sentences the author furnishes an estimate, at once modest and accurate, of the work he has taken in hand:—"I shall commence with man at the most remote period at which his presence is attested. I shall follow his progress through the respective ages of the various kinds of flint implements, and then of metals. I shall examine in detail all that remains to us from these different periods, comparing each class of objects carefully with others apparently of similar date found in different regions, or actually in use in the same spots. My work will exhibit no doubt, particularly with regard to the earliest times, numerous deficiencies. Those who reflect that anthropological and archaeological researches in the Caucasus are as yet in their infancy may wonder that I should have so soon ventured to collect into a whole the scanty observations hitherto recorded.

"My hope in presenting this attempt at a comprehensive view is to indicate the importance and variety of the problems which await the naturalist, the linguist, and the archaeologist as the scientific study of the Caucasian region advances. It is not sufficiently recognised how defective is our anthropological information with regard to this mountainous isthmus, in which so many races have sought a refuge. I shall hold myself sufficiently rewarded if this work, by unrolling before the eyes of the scientific world the prospect of a new field for research, vast, varied, and full of promise, serves not only to stimulate to fresh activity the *savants* who have already devoted themselves to Caucasian ethnography, but attracts also fresh investigators. The irresistible charm of this beautiful country will probably draw me back to it more than once again. Happy to contribute in my own branch of study to the better knowledge of this portion of Western Asia, I shall neglect no occasion to pursue the task I have traced out for myself. It can hardly be doubted that the importance of the work in hand will draw to it other persevering explorers, and that in a near future the demands of science will be adequately responded to and satisfied."

The pages at the commencement of the chapter on the paleolithic age, devoted to the traces of ancient glaciers on either flank of the Caucasus, cannot be considered satisfactory. They are a recapitulation of the observations of Abich and E. Favre, but the summariser has not distinguished between facts proving simply such oscillations of the ice as may have occurred in recent times and those bearing on the more extensive advances of glacial periods. Personal experience leads the writer to doubt the expediency of asserting broadly that "the ice appears never to have descended very low on the south side," and the topographical statements are anything but clearly arranged. The common erroneous statement as to the present small dimensions of the Caucasian icefields is (as might be expected) repeated on the authority of former travellers who were ill-provided for glacier exploration.

Of the quaternary epoch the traces discovered in the Caucasus are rare. M. Chantre describes only a cave on the Kvirila, a tributary of the Rion followed by the Tiflis Railway, which appears to have been but imperfectly examined. A series of plates and descriptions illustrate the very remarkable dolmens recently explored and photographed by Messrs. Bayern and Felitzine, in the vicinity of Novo Rossisk and Maikop. Implements assigned to the bronze age, amongst others a scythe and a grooved dagger resembling very closely those now in use, and a mould for daggers, are also depicted. The conclusion arrived at is that bronze was sparingly produced locally, and that the manufacture never reached any high degree of development in the Caucasus.

The second volume is devoted to illustrations of the objects discovered in cemeteries in various spots in Ossetia and Kabarda, at Gori, and elsewhere, which are attributed, with certain obviously very useful reserves, to what M. Chantre calls the protohistoric period. The discoveries at Kazbek or

Stephans-minda—Kazbek is the name of a local chief, transferred by the Russians both to the post-station and mountain—were peculiarly interesting, and have furnished archæologists material for exceptionally bold speculations. Bayern, for instance, was convinced that the objects found prove the spot to have been resorted to by the Amazons to worship Priapus! The cup (figured plates 113-4) is surely, though M. Chantre does not say so, of Roman workmanship, and may, with the fibulas of similar character and the coins of Constantine found in Ossetia, and the Roman surname recognised by Prof. Kovalevsky among the Ossetes of the Terek, be taken as traces of the legions who once held the Dariel Pass against the hordes of Asia. The objects discovered are generally similar to those found throughout Western Europe in similar burial-places. A local peculiarity is the frequent use of the head of the Caucasian "tur," or wild goat, as a model for ornamental purposes. It appears that Prof. Virchow has rashly ventured to doubt this origin, and believes that a domestic sheep was the model. He can hardly be aware how large a part is played by these horns in Caucasian decoration to the present day.

Amber beads, similar to those now worn by the women of Gebi on the Upper Rion, are found in some of the tombs. M. Chantre has to admit that the story and relations of the "protohistoric" races who inhabited the Caucasus are still dark. It is altogether probable, and from the objects found we may fairly infer, that they were fellows or branches of the tribes who possessed Western Europe. But similarities in early art must not be treated as in themselves conclusive proofs of near relationship in the artisans, otherwise American and Polynesian discoveries might be taken to establish a close universal kinship.

The third volume deals with the historical antiquities found mainly in tombs in Ossetia, on the Upper Uruch in the Digor district. Native art, representing animals in the style of children's gingerbread, is here mixed with Byzantine coins and beautifully enamelled ornaments. There is an obvious mixture of the imported products of a high civilisation and the rude efforts of local artificers.

Specimens of the "Kamene Babas," or sepulchral stones terminating in a human bust, common on the steppes of Ciscaucasia, and apparently of Turanian origin, are also figured.

In the fourth volume the existing populations of the Caucasus are brought before us.

M. Chantre divides the inhabitants of the Caucasus in the following fashion. First, he places "*the Caucasian races*" in five chief groups:—1. The Karthalinian (Georgian), including Khevsours, Pchaves, Touches, Imeritians, Mingrelians, Suanetians, Gourians, and Lazes. 2. The Cherkess (Circassian), including, with others, the Abchasians and Kabardans. 3. The Ossetes. 4. The Chetchens. 5. The Lesghians, including apparently almost all the Daghestanis.

He places apart as *Turanians* the Tartars, Karatchais, and others; as *Semites*, Arabs, Chaldeo-Assyrians, and Jews (asserting frequently as to the last that many were sent into the country in the time of Cyrus!); as *Aryans*, an Iranian group of Kurds, Armenians, &c., and a European group of Russians, &c.

This classification does not appear to correspond altogether to the great lines of division between the peoples of the Caucasus. It sacrifices, to some extent, affinities of race to the accidents of local distribution. The Ossetes are Iranians. The Cherkess and their sub-tribes are a separate race, divided in language and customs from all others.

The detailed accounts of the tribes are of unequal fulness and value. Those of the Ossetes, Chevsurs and Cherkess are the fullest and best, although with regard to the first M. Chantre has not had the advantage of studying Prof. Kovalevsky's recent volumes; that of the Svans leaves something to be desired. Surely the dance described as specially characteristic of this tribe is identical with that of the Cossacks of the Kuban. But the volume, as a whole, is a compendium of information and references which will be indispensable to the ethnographer or geographer who is making a study of the Caucasus. Even the ordinary reader will find in the accounts of the Cherkess much to interest him.

He may compare the notes furnished from Cherkess sources by M. Erekert, in the March number of 'Pettermann's Mittheilungen,' on the traditions of the Arabian origin of some Circassian families. Neither author has referred to a possibly earlier reference to such a connection in three lines of Æschylus (whose information about the Caucasus was far sounder than that of many of his commentators !):—

Ἄραβίας τ' ἄρειον ἄνθος,
ἡφίκρημον οἱ πόδισμα
Καυκάσου πύλας νέμονται.

M. Chantre quotes a very poetical legend explaining the absence of any Circassian literature or written language. But he does not answer the questions which must present themselves to many of his readers. Are the Circassians the descendants of the dolmen-builders? Do their dolmens resemble those recently found in Syria? Are they the remains of a primitive Semitic stock, overlapped on one side by the Indo-European Georgians, on the other by the Turanians from Northern Asia?

There are other problems more of detail which the volume leaves unanswered. What are the affinities of the great tribe of Avars, still nearly 100,000 strong, of members of which so many capital portraits are given—some, by the bye, in Cossack uniform? Where are the limits to be drawn between sub-branches of the Georgian races and people whom, for want of knowing better, we must still call in a lump Lezgians or Daghestanis? There is, in truth, much still to be learnt and laid down. For the present, investigators who will content themselves with a limited field, and work that thoroughly before going on to another, like Prof. Kovalevsky, will probably do the best service to science.

Meantime these volumes will form a splendid and enduring record both of the liberality of the French Government, which has enabled them to be profusely illustrated, and of the industry and wide study of their author. M. Chantre's readers will possibly regret that his personal experiences of Caucasian travel have been limited so much to high roads and their vicinity; some may consider that in transcription from others he has hardly exercised as fully as he might have done his powers of collation and criticism. But, after any such deductions have been made, students of Caucasian ethnology and archaeology will gratefully acknowledge their large indebtedness to all concerned in the production of this monumental work. To the cranial and anthropometrical measurements, of which it contains a large collection, the descriptions of ancient customs, laws, and religious rites, the photographic plates of treasures of Byzantine or Georgian art lying secreted in the closed churches of Suanetia, it would be out of place in these pages to do more than call attention in passing. There is food in M. Chantre's five volumes for the most varied tastes, and the author will be rash who ventures in future to write on the Caucasus without consulting them. The attention of ethnologists may be particularly directed to the place occupied by the Semitic race in the Caucasian isthmus. M. Chantre throws out several casual remarks (though he seems still far from following them out to any conclusion), which may confirm the anticipations of those who, with the present writer, believe that the connection of a large portion of the primitive inhabitants of the western Caucasus with this branch of humanity will be ultimately established.—[D. W. F.]

Doughty, Charles M.—*Travels in Arabia Deserta.* Cambridge, University Press, 1888: 2 vols. 8vo., i. pp. xx. and 623; ii. pp. xiv. and 690. Price 3*l.* 3*s.*

Mr. Doughty's valuable work on Arabia Deserta has already been noticed in the 'Proceedings,' vol. viii. p. 341. The completion of it is welcome. The field embraced in his travels, and the character of his observations, have been already fully described in the 'Proceedings,' vol. vi. The complete narrative abounds with details of great interest on the country, the people, and the remains of antiquity. The work is richly illustrated and is accompanied by the map presented by Mr. Doughty to the Royal Geographical Society. One of its most valuable features is the Index and Glossary of Arabic words, covering 148 pages. The book will no doubt take rank as a standard work on the interesting region to which it refers.

Favre, Ernest.—*Recherches Géologiques de la Chaîne du Caucase.* Geneva, 1875: 4to., pp. viii. and 117. Price 10s.

This slender volume is the result of the travels of M. E. Favre on both flanks of the Central Caucasian chain in 1868. It remains the best account of the geology of the districts visited, and considering the time in which the information was gathered, its general exactness and extent are very remarkable. The outlines of the structure of the parallel ridges which form the Caucasian chain are very well indicated, and it is only when he comes to deal in detail with the glaciation and structure of the central chain itself, a region inaccessible to the ordinary traveller, that M. Favre is notably at fault. He denies the existence both of the great névé basins and of the huge glaciers that descend from them between the sources of the Baksan and the Mamisson Pass. He makes little attempt to distinguish accurately between the granites and schists of the upper gleus. Above the snow-line much remains to be done. In the lower regions, particularly on the Black Sea slope, M. Favre's observations are full, and he writes with the authority of a trained observer. The map which accompanies the volume is very clear and valuable.—[D. W. F.]

Larrien, [Abbé].—*La grande Muraille de Chine; où il est prouvé que cette muraille, telle qu'elle est communément décrite, non seulement n'existe pas, mais même n'a jamais existé.* Suivi d'un article sur la Barrière de Pieux du Léao-tong. Paris, Ernest Leroux, 1887: 8vo., pp. 23. [Presented by the Author.]

AFRICA.

Mathers, Edward P.—*The Gold Fields Revisited, being Further Glimpses of the Gold Fields of South Africa.* Durban and Maritzburg, Natal, P. Davis & Sons, 1887: 8vo., pp. viii., xxvi., and 352, maps. [Presented by the Author.]

— *Golden South Africa, or the Gold Fields Revisited; being Further Glimpses of the Gold Fields of South Africa.* London, W. B. Whittingham & Co., 1888: 8vo., pp. viii. and 389, maps. Price 2s. 6d. [Presented by the Publishers.]

These are two issues of the same work, which contains a full description of the South African gold-fields. Much of the matter has already appeared in newspaper form, but the author has done well in thus revising and extending these press jottings and bringing them together in the present convenient form. In the Appendices will be found tables of distances, and a list of South African gold-mining companies.

Schweinfurth, G.—*Sur une récente exploration géologique de l'Ouadi Arabah.* Extrait du Bulletin de l'Institut Égyptien de l'année 1887. Le Caire, Jules Barbier, 1888: 8vo., pp. 19. [Presented by the Author.]

— *Sur la flore des anciens jardins arabes d'Égypte; Extrait du Bulletin de l'Institut Égyptien de l'année 1887.* Le Caire, Jules Barbier, 1888: 8vo., pp. 44. [Presented by the Author.]

AMERICA.

Mathews, Edward D.—*British Guiana and Venezuela.* London, C. Straker & Sons [1888]: 8vo., pp. 16, map.

Peralta, D. Manuel M. de.—*El Canal Interoceanico de Nicaragua y Costa-Rica en 1620 y en 1887. Relaciones de Diego de Mercado y Thos. C. Reynolds con otros documentos recogidos y anotados.* Bruselas, Imp. de Ad. Mertens, 1887: 8vo., pp. 86.

Storm, [Dr.] Gustav.—*Studier over Vinlandsreiseerne. Vinlands Geografi og Ethnografi. Aarbøger for Nordisk Oldkydighed og Historie, 1887, II. Række, 2 Bind, 4 Hefte, pp. 293-372.*

OCEANIA.

Smith, S. Percy.—The Kermadec Islands; their Capabilities and Extent. Wellington, 1887: 8vo., pp. 29. [Presented by the Author.]

Mr. Percy Smith, Assistant Surveyor-General of New Zealand, accompanied the party sent in August 1887 to annex the Kermadec Islands to Great Britain. His function was to make a survey of the islands, and the results he gives in this narrative. The group is situated between the parallels of $29^{\circ} 10'$ and $31^{\circ} 30'$ S. lat., and between the meridians of $177^{\circ} 45'$ and 179° W. long. There are four islands with some outlying islets and rocks, the most northerly, Raoul or Sunday Island, being 674 miles north-east of Auckland; the other islands lie S.S.W. from the principal island, Macaulay being distant 68 sea-miles, Curtis 22 miles from Macaulay, and L'Espérance 52 miles from Curtis. The extremes of the group are thus 142 sea-miles apart. Mr. Smith has taken much trouble to collect information concerning the early history of the islands, and the results he places on record in his interesting report. The first real settlers were two Englishmen named Baker and Reid, who had married two Samoan girls, and landed on Sunday Island in 1837. They both had families, but all had cleared out by 1848, tired of the isolation. After this various people settled on Sunday Island, but left after a few years' trial, until in 1878 a Mr. Bell and his family, from Samoa, took possession, and were still settled there at the time of Mr. Smith's visit. European vegetables, bananas, and other cultures have been introduced, and flourish satisfactorily. The islands are all volcanic; in two of them, indeed, signs of volcanic activity are to be seen at the present day, though on a limited scale. They appear to be situated on an oceanic plateau which extends from New Zealand to the Tonga group, on which soundings are obtained at depths much less than in the adjacent areas, but still so great as to show that the islands form as it were the tops of volcanic cones rising to a great height above their bases. The depth of water between Sunday Island and Macaulay Island is 3960 feet, and forty miles north of the first named it is 3600 feet. The group is situated in the north-easterly production of the axis of the volcanic zone of the Bay of Plenty, which, continued still further north-eastward, strikes the Tonga and Samoan groups, places where volcanic action is still going on. Two, if not three, volcanic disturbances have taken place at the Kermadec Islands within recent years, and earthquakes were very frequent there at one time. A very severe one took place on the 5th April, 1881; but since the eruption of Tarawera on the 10th June, 1886, they have ceased entirely. The eruption of 1870 or 1872 was evidently a very violent one; not only was the great crater on Sunday Island much affected by the covering of mud, stone, and pumice scattered all over it, but a small island was upheaved in Denham Bay, which, while it remained, formed a shelter sufficient for vessels to anchor under. Being in south latitude 30° , the islands are outside the influence of the trade-winds, but are situated in the so-called "variables." The prevailing winds are south-west and westerly in winter, and north-east and easterly in summer. The rainfall appears to be plentiful, but still not too much. The climate is mild and equable as to temperature.

The following are the areas of the islands and islets of the group:—Sunday Island, 7200 acres; Herald group of islets, 85 acres; Macaulay Island, 764 acres; Curtis Islands, 128 and 19 acres; L'Espérance, 12 acres; total, 8208 acres. Sunday Island is 20 miles in circumference, and is roughly triangular in shape. The highest point on it—Moumoukai—is 1723 feet above sea-level. It is rugged and broken over a very large extent of its surface, and, except in a few places, is covered with forest. The most prominent feature in its topography is the large crater, occupying a position nearly central, but somewhat nearer the northern shore. This crater is a mile and three-quarters long by a mile and a quarter in width, and, as the bottom of it is but 40 feet above sea-level, its walls are generally over 1000 feet high, and occasionally rise to 1500 feet and 1700 feet, though they fall to 180 feet in one place on the north side. From the crater-rim ridges extend in several directions towards the coast, and in most cases end in abrupt cliffs and bluffs, frequently 1000 feet high. The ridges have many steep gullies scoring their sides, but notwithstanding this, a

considerable area of somewhat broken, not to say undulating country may be found, not too steep for cultivation. Of level land there is exceedingly little. The Green Lake is a perfect little crater, and on its banks in several places the steam still escapes, but not in any great amount. The water is cold, and has somewhat of a mineral taste. Steam also escapes from crevices in the precipitous cliffs of Denham Bay, and warm water oozes out of the sand at low water on the north coast, thus showing that the volcanic forces have not entirely ceased action. The soil everywhere on the island is very rich. The great luxuriance and richness of the vegetation all bear witness to the excellence of the soil, which is everywhere—except where destroyed by the eruption, and on the steep cliffs—the same rich loam. The vegetation has a strong New Zealand facies: indeed it is difficult to believe, when down in some dark gully, that one is not in northern New Zealand. The forest is composed for the most part of pohutuhawa of all ages and sizes. A handsome variety of the New Zealand nikan-palm grows to a large size and in great quantities. Mapou, whauwhau, karamu, ngaio, karaka, hawahawa, and tutu are the principal New Zealand forms. Two varieties of tree-fern grow to a very large size. There are other trees peculiar to the island or to Polynesia, amongst which the corumbium (a remarkably handsome tree), the candlenut or tuitui, and a handsome dracæna, the root of which is very rich in sugar, are most noticeable. Ferns abound everywhere, as does the triangular-stemmed toetoe or cutting-grass. This and the Cape gooseberry take possession of the cleared land, to the exclusion of anything else. Of the introduced plants Mr. Smith gives a long list. Fish abound round the coast in great quantities. Several turtle of the hawksbill kind were seen, but they are apparently very difficult to catch. They do not breed here, but go north to the warmer coral islands. The land birds are very few—a tui (whose note differs somewhat from that of the New Zealand species), a kingfisher, a lark, parroquets (on Meyer Island), a hawk, the grey duck, and, strangest of all, a pukeho, whose presence here raises some questions as to the origin of the avifauna most difficult to answer. A pigeon like that of New Zealand, and other birds, have become extinct since the introduction of cats, which have become wild and increased very much. The little blight-bird (*Zosterops*) was seen, and it is said the larger cuckoo—the kohoperoa—is common in September, whilst the smaller one—the pipi-wharauoa—is more rarely seen. Strange to say, some linnets and goldfinches found their way to Sunday Island two years ago, but they have not been seen since. The albatross breeds in Nugent and Napier islets, the gannet (without the yellow head) on Meyer Island; but the bird of most importance is the mutton-bird, which breeds here in September and October. It lays its eggs on the ground amongst the trees on the hills. The only mammal native to the island is a small grey rat, which is very plentiful in summer, but is supposed to hibernate during the winter. The island has no harbour, and the only place approaching even to a bay is Denham Bay on the west side, and this is exposed to the west and south-west winds, which cause a tremendous ocean-surf to break on the beach.

The Herald Islets form a group of eight islets and rocks, lying on the north-east side of Sunday Island, and from one to two miles off it. Macaulay Island, situated 68 miles to the south of Sunday Island, is the next in point of size, though it is but about a tenth of the area of Sunday Island—i.e. 756 acres. It is a little over a mile and a quarter long from east to west, and somewhat over a mile north and south. Seen from any side it presents a pleasant appearance. It is also an old volcano, but now quite extinct. The highest point, which is situated at the western end, is 781 feet above the sea-level, and from here the surface inclines to the east by gentle slopes and easy undulations, somewhat cut up by shallow gullies, and the whole clothed with a beautiful sward of grass, so smooth and so green as to resemble in some parts an English lawn.

Curtis Islands are two remarkably rocky islets, situated 22 miles from Macaulay. They are separated by a deep channel about a quarter of a mile wide. At the north-west end there is a fine little cove, which runs in for about a hundred yards, with plenty of water in it. The head of this cove leads right into a crater. The crater is very interesting, inasmuch as it is still

active, though in the solfatara stage, and sends forth a considerable amount of steam from numbers of fumaroles scattered over its bottom. It is formed by an encircling ring of steep precipitous cliffs—excepting where the cove breaks in on the north-west side—of about 400 to 450 feet altitude. The diameter of the crater is about 150 yards.

L'Espérance, or Brind, or French Rock, is situated 52 miles S. $\frac{1}{2}$ W. (mag.) from Curtis Island. It is a bare, desolate-looking rock, about 250 feet high and about 250 yards long.

The Report is amply illustrated with maps and views.

GENERAL.

Blackie, W. G.—Commercial Education. An Address delivered, by request, to the Members of the Glasgow Local Association of the Educational Institute of Scotland, on Saturday 17th March, 1888. Glasgow, Edinburgh, and London, 1888: 8vo., pp. 52. [Presented by the Author.]

[Forsyth, Sir Douglas.]—Autobiography and Reminiscences of Sir Douglas Forsyth, C.B., K.C.S.I., F.R.G.S. Edited by his Daughter. London, Bentley & Son, 1887: pp. v. and 283. Price 12s. 6d.

The autobiography in this volume occupies only 50 pages. Though somewhat fragmentary, it will be welcome to all who knew Sir Douglas. Most of the remainder of the volume is compiled from the official report of Sir Douglas's missions, while a concluding chapter gives a few details concerning his closing years. The volume affords a fair idea of Sir Douglas Forsyth's career.

Metchnikoff, Léon.—Les Grands Fleuves Historiques. Extrait d'un cours fait à l'Académie de Neuchatel. Bulletin de la Société Neuchateloise de Géographie. Tome iii. 1887, pp. 35–100.

This is a detailed study of the function of great rivers with reference to the development of civilisation. The present instalment, after some general considerations, deals with the Nile. From a geographical standpoint, M. Metchnikoff divides history into three great periods:—I. Ancient Times, comprising the histories of the four great civilisations, in Egypt, Mesopotamia, India, and China, the spheres of which were regions watered by certain great rivers. This is divided into (1) the epoch of isolated peoples, which in the West closed about the eighteenth century B.C.; (2) the epoch of first contacts between historical peoples, ending about 800 B.C.; this epoch besides had for its theatre the region between the Persian Gulf and the east and south-east littoral of the Mediterranean. II. The Middle or Mediterranean Period, subdivided into (1) the epoch of the Mediterranean comprising the oligarchical republics, the Phœnicians, Carthaginians, Greeks, and Italians, as also the Roman Empire to Constantine; (2) epoch of the Mediterranean beginning with the foundation of Byzantium at the entrance to the Black Sea, and which embraces the whole of the Middle Ages. III. Modern Times, characterised by the marked preponderance of the oceanic states, and subdivided into (1) Atlantic epoch, embracing the gold fever of California, English colonial progress in Australia, Russian conquests on the Amur, and the opening of China and Japan; (2) Universal epoch, which has not yet begun.

[Physical Geography.]—Our Earth and its Story: a Popular Treatise on Physical Geography. Edited by Robert Brown, F.R.D., F.L.S. London, Cassell & Co., 1887: 4to., pp. viii. and 376. Price 9s. [Presented by the Publishers.]

This work was originally intended to be mainly a translation of Kirchhoff's 'Unser Wissen von der Erde,' which has been noticed in the 'Proceedings.' As, however, Dr. Brown did not consider that work adapted to an English public, the changes which he has found it necessary to make "are tantamount to a rewriting of the original treatise . . . Nothing of the original has been retained, except what relates to the illustrations, and even these have been supplemented by many new cuts, with the object of rendering the text more

easy of comprehension." The new illustrations are some of them very old, and are not quite equal in quality and appropriateness with those in the original German. The text is much more popular and less systematic than the German, but may be taken as on the whole a trustworthy and readable account of some of the great facts of physical geography. Undue space (150 pages) is devoted to earthquakes, volcanoes, and geysers.

Rawson, [Sir] Rawson W. [K.C.M.G., C.B.]—Synopsis of the Tariffs and Trade of the British Empire. Prepared, and presented to the Commercial Subcommittee of the Imperial Federation League, by its Chairman, Sir Rawson W. Rawson, K.C.M.G., C.B. London, Office of the Imperial Federation League, 1888: 8vo., pp. 83, tables. Price 2s. 6d. [Presented by the Author.]

Reclus, Elisée.—The Earth and its Inhabitants. The Universal Geography. Edited by E. G. Ravenstein, F.R.G.S., &c., and A. H. Keane, B.A. Vols. I.-XII. London, J. S. Virtue & Co.: imp. 8vo., maps and illustrations. Price per volume 21s.

Vol. I. Southern Europe (Greece, Turkey in Europe, Roumania, Servia, Italy, Spain, and Portugal).—Vol. II. France and Switzerland.—Vol. III. Austria-Hungary, Germany, Belgium, and the Netherlands.—Vol. IV. The British Isles.—Vol. V. The North-East Atlantic. Islands of the North Atlantic. Scandinavia. European Islands of the Arctic Ocean. Russia in Europe.—Vol. VI. Asiatic Russia.—Vol. VII. East Asia.—Vol. VIII. India and Indo-China.—Vol. IX. South-Western Asia.—Vol. X. North-East Africa.—Vol. XI. North-West Africa.—Vol. XII. West Africa.

Schöner, Johann.—A Reproduction of his Globe of 1523, long lost, his Dedicatory Letter to Rhymer von Streytperck, and the 'De Moluccis' of Maximilianus Transylvanus, with new Translations and Notes on the Globe by Henry Stevens, of Vermont, U.S.A. Edited, with an Introduction and Bibliography, by C. H. Coote, of the British Museum. London, Henry Stevens & Son, 1888: pp. xlv. and 206, with portrait of Schöner, woodcuts, and facsimiles of globes, &c. Price 18s.

This is a well got-up little volume on a subject of much interest to the student of early geography. The globe to which it mainly refers was purchased by Mr. Henry Stevens, and was subsequently sold to another collector, Mr. H. Kalbfleisch, of New York. It is one of the earliest known productions of the kind, having been preceded only by the well-known one by Martin Behaim, of Nuremberg, of 1492, and the anonymous Laon globe of 1493 in pre-Columbian times, and by the Hunt-Lenox globe now preserved in the Lenox Library of New York, and by the two earlier globes of Schöner, dated respectively 1515 and 1533, in post-Columbian times. The importance of Schöner's third (1523) globe lies in the fact that it was the first on which an attempt was made to lay down the track of Magellan's vessel the *Victoria*. The author, Johann Schöner, was born at Carlstadt, in Franconia, in 1477, and devoted himself to geographical science. It was doubtless through his devotion to his favourite studies that he was deprived of his prebend at Bamberg. We are told that the fame of his talents spread so far that in 1526, upon the advice of Melancthon, he was nominated to the chair of mathematics in the new Gymnasium at Nuremberg. The late Mr. Stevens has done service in collecting the material for this volume, and his friend Mr. Coote has worthily carried out his task, adding a bibliography of Schöner's works, and a good index.—[E. D. M.]

Sieger, [Dr.] Robert.—Die Schwankungen der hocharmenischen Seen seit 1800 in Vergleichung mit einigen verwandten Erscheinungen. I. and II. 'Mitteilungen der k. k. Geographischen Gesellschaft in Wien,' No. 2, 1888.

Soyka, [Dr.] Isidor.—Die Schwankungen des Grundwassers mit besonderer Berücksichtigung der Mitteleuropäischen Verhältnisse. 'Geographische Abhand-

lungen,' herausgegeben von Prof. Albrecht Penck, Band ii. Heft 3. Wien, Hölzel: royal 8vo., pp. 84. [Presented by the Publisher.]

This is a careful study of the various conditions of the occurrence of underground water, with special reference to Central Europe. Dr. Soyka deals (1) with the origin and distribution of underground waters; (2) with the relation of precipitation and atmospheric moisture to the variations in underground waters; (3) relations between underground waters and surface water-courses; (4) the agreement of hydrometeoric phenomena, according to time and place.

The Statesman's Year-Book: Statistical and Historical Annual of the States of the Civilised World for the year 1888. Edited by J. Scott Keltie, Librarian to the Royal Geographical Society. Twenty-fifth Annual Publication. London, Macmillan & Co., 1888: cr. 8vo., pp. xxiv. and 988. Price 10s. 6d. [Presented by the Publishers.]

Transactions of the Seismological Society of Japan. Vol. XI., 1887. Yokohama, printed at the Office of the 'Japan Mail': 8vo., pp. 177, maps and plates.

This volume contains the following papers:—Earth Tremors in Central Japan. By John Milne, F.G.S.—The Severe Japan Earthquake of the 15th of January, 1887. By Professor Seikei Sekiya.—Earthquake Effects, Emotional and Moral. By John Milne, F.G.S.—On Construction in Earthquake Countries. By the same.—A Model showing the Motion of an Earth-particle during an Earthquake. By Prof. Seikei Sekiya.

The following works have also been added to the Library:—

Adams, Arthur.—Travels of a Naturalist in Japan and Manchuria. London, Hurst & Blackett, 1870: 8vo., pp. x. and 334, plate.

[**America, United States.**]—Department of the Interior. U.S. Geographical and Geological Survey of the Rocky Mountain Region. J. W. Powell, in charge. Contributions to North American Ethnology. Vols. III. and V. Washington Government Printing Office, 1877 and 1882: 4to., pp. (Vol. III.) 635, (Vol. V.) 112, 32, xxxvii., and 237, map and plates. [Presented by the Survey.]

Bernoville, Raphael.—La Souanétie Libre. Épisode d'un voyage à la Chaîne Centrale du Caucase. Paris, V. A. Morel et Cie, 1875: 4to., pp. 170. Price 1l. 5s.

The author of this book describes a visit to Radsha and Suanetia, districts lying at the sources of the Ingur and Rion, on the southern slopes of the Caucasus. The only portion of his route previously undescribed is the pass by which he crossed from the Rion to the upper valley of the Skenes Skali. The most important part of the volume deals with Suanetia, which the author visited under peculiarly favourable circumstances in company with Count Levershof, who, when Governor of Kutais in 1869, made an armed promenade through Free Suanetia. M. Bernoville was thus enabled to visit in detail many of the abandoned churches of this district and the singular treasures they contain, which are kept rigorously closed to the ordinary traveller. Architectural plans of these churches, and woodcuts of several of the pieces of ancient Byzantine silver work found in them, are contained in the volume. It is also illustrated with many excellent lithographs from photographs taken by a member of the expedition. One or two of the illustrations, however, are examples of a danger which exists in the use of photographic material. In the originals the mountains were clouded; in the lithographs the clouds have been removed, but the peaks which ought to be beneath them do not appear. M. Bernoville has either transcribed from other authors or collected himself many interesting details with regard to the Suanetians, and on all subjects, except perhaps orography, is an authority worthy of confidence.

Boyde, [Capt.] Henry.—Several Voyages to Barbary. Containing an Historical and Geographical Account of the Country. With the Hardships, Sufferings, and manner

of Redeeming Christian Slaves. Together with a curious Description of Mequinez, Oran, and Alcazar. With a Journal of the late Siege and Surrender of Oran. To which are added, the Maps of Barbary and the Sea-Coasts; the Prospects of Mequinez and Alcazar; an exact Plan of Oran, and a View of the Ancient Roman Ruins near Mequinez. The Whole Illustrated with Notes, Historical and Critical. The Second Edition, Corrected. London, Printed for Olive Payne, &c., 1736: 12mo., pp. (146) and (158).

Church, George Earl.—The Venezuela Central Railway and its Sources of Traffic. London, Waterlow & Sons, 1888: 8vo., pp. 35. [Presented by the Author.]

Degrandpré, L.—Voyage à la Côte Occidentale d'Afrique, fait dans les années 1786 et 1787; contenant la description des mœurs, usages, lois, gouvernement et commerce des États du Congo, fréquentés par les Européens, et un précis de la traite des Noirs, ainsi qu'elle avait lieu avant la Révolution française; suivi d'un Voyage fait au cap de Bonne-Espérance, contenant la description militaire de cette colonie. 2 vols. in 1. Paris, Dentu, 1801: 8vo., pp. (vol. i.) 32, xxviii., and 226; (vol. ii.) 326, plates.

NEW MAPS.

(By J. COLES, *Map Curator* R.G.S.)

EUROPE.

Deutschen Reiches.—Karte des ——. Scale 1:100,000. or 1·3 geographical miles to an inch. Sheets: 427, Landsberg in Ob. Schlesien. 544, Worms. Herausgegeben von der kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme, 1888. Price 1s. 6d. each sheet. (*Dulau.*)

France.—Carte de ——, dressé par le Service Vicinal par ordre de M. le Ministre de l'Intérieur. Scale 1:100,000 or 1·3 geographical miles to an inch. Paris, 1888. Sheets: III.—14, Lesneven; III.—16, Douarnenez; III.—17, Pont-l'Abbé; V.—14, Lannion; IX.—11, Carentan; X.—16, Laval; XII.—28, Coutras; XXII.—35, Martigues; XXIV.—23, St. Claude; XXIV.—28, le Bourg-d'Oisans; XXV.—23, Thonon; XXV.—24, Bonneville. Hachette et Cie, Paris. Price 7d. each sheet. (*Dulau.*)

Germany.—Generalkarte von Hannover, Oldenburg, Braunschweig, Hamburg, Bremen und Lübeck. Nach den neuesten Materialien entworfen und gezeichnet. Scale 1:600,000 or 8·2 geographical miles to an inch. Giogau, Flemming. Price 1s. 6d. (*Dulau.*)

Italia.—Carta d' ——, disegnata da Carlo Cerri, alla scala da 1:864,000 or 11·8 geographical miles to an inch. Milano. Price 9s. (*Dulau.*)

Ober-Elsass.—Spezialkarte vom ——. Scale 1:200,000 or 2·7 geographical miles to an inch. Von J. L. Algermessen. Metz, Lang. Price 2s. (*Dulau.*)

Oesterreichisch-Ungarischen Monarchie.—Spezialkarte der ——. Scale 1:75,000 or 1 geographical mile to an inch. K. k. militär-geografisches Institut, Wien. Sheets: Zone XI., Col. 23, Rosenau und Sailas; XIII.—22, Arló und K. Terenne; XIV.—26, Nagy-Kálló und Nyer-Bátor; XIV.—28, Kányaháza und Szatmár; XX.—25, Apatelek und Simand; XX.—26, Borosjenő und Buttyin; XXIX.—11, Zapuntello; XXIX.—13, Novegradi und Benkovac; XXX.—13, Zaravecchia und Stritto; XXX.—21, Zabukvica. Price 1s. 4d. each sheet. (*Dulau.*)

Rendsburg.—Plan von —. Nach den neuesten Aufnahmen und mit der Lage des Nord-Ostsee-Canals. Scale 1:5000 or 14.5 inches to a geographical mile. Rendsburg, Berger. Price 1s. (*Dulau.*)

Russland.—General- und Strassenkarte von West — und den angrenzenden Ländern bis Wien und Budapest. Scale 1:1,500,000 or 20.4 geographical miles to an inch. Von G. Freytag. Wien, Artaria & Co. Price 3s. (*Dulau.*)

Schwarzwaldes.—Spezialkarte des —, für Touristen, bearbeitet von J. L. Algermissen. Scale 1:200,000 or 2.7 geographical miles to an inch. Metz, Lang. Price 2s. 6d. (*Dulau.*)

Schweiz.—Wandkarte der —, von J. M. Ziegler. Scale 1:200,000 or 2.7 geographical miles to an inch. Zürich, Wurster & Co. 8 Blatt. Price 10s. (*Dulau.*)

ORDNANCE SURVEY MAPS.

Publications issued during the month of March 1888.

1-inch—General Maps:—

SCOTLAND: Sheets 78, 89, hill-shaded, 1s. 9d. each.

6-inch—County Maps:—

ENGLAND AND WALES: **Anglesey:** 2 S.W., 3 S.W., 7 N.W., S.W., 12 N.E.; 1s. each. **Brecknockshire:** 7 N.W., N.E., 9 S.W., 10 N.W., S.W., 17 N.E., containing Brecknock, 22 N.E., 23 N.W., 28 S.W., 44 S.E.; 1s. each. **Cardiganshire:** 36 S.W., 41 S.E.; 1s. each. **Carmarthenshire:** 3 S.W., 7 S.E., 24 N.E., 32 N.W., S.W., S.E.; 1s. each. **Cornwall:** 18 S.W., 24 S.W. and 24A S.E. on one sheet, 27 N.W., N.E., 32 N.E., S.E., 39 N.W., S.W., 40 N.W., 49 S.W., 65 S.E., 71 N.W., 72 N.E. and 72A N.W. on one sheet, 84 S.W., 90 N.E.; 1s. each. **Devonshire:** 79 S.E.; 1s. **Dorsetshire:** 21 N.W., 41 N.W., N.E., S.E., 42 S.W., S.E., 47 N.E., 48 N.W., N.E.; 1s. each. **Gloucestershire:** 74; 2s. 6d. **Herefordshire:** 10 S.W., 16 S.E., 23 N.E., S.E., 30 N.E., 50 N.W., 51 S.E., 1s. each. **Huntingdonshire:** 8 N.E.; 1s. (*Huntingdonshire is now complete on the 6-inch scale in 89 quarter-sheets at 1s. each.*) **Leicestershire:** 34 S.E.; 1s. (*Leicestershire is now complete on the 6-inch scale in 180 quarter-sheets at 1s. each.*) **Lincolnshire:** 22 N.W., S.W., 47 N.E., S.E., 73 S.W., S.E., 113 N.E., 124 N.W., 127 S.E., 128 S.E., 132 N.W.; 1s. each. **Merionethshire:** 28 N.E., S.E., 34 N.E., S.W., 35 N.W.; 1s. each. **Montgomeryshire:** 7 N.W.; 1s. **Radnorshire:** 14 N.W., S.W., 25 S.W., 29 N.E., S.E., 33 N.E., S.E., 36 N.E., 38 N.E., 39 N.W.; 1s. each. **Shropshire:** 52 N.E.; 1s. **Somersetshire:** 59 S.W., 68 N.E., 79 N.W., 84 N.W.; 1s. each. **Warwickshire:** 6 S.E., 21 N.E., containing part of Coventry; 1s. each. **Wiltshire:** 14, 16, 19, 2s. 6d. each.

25-inch—Parish Maps:—

ENGLAND AND WALES: **Brecknockshire:** XXI. 14, 15, XXVII. 10, 13, 14, XXXV. 3, 7, XLII. 5, 3s. each. **Cambridgeshire:** III. 4, 8, 13, 16, IV. 1, 3s. each; IV. 2, 5s.; IV. 3, 4s.; IV. 4, 3s.; IV. 5, 6, 4s. each; IV. 7, 3s.; IV. 9, 10, 13, 14, V. 15, 4s. each; V. 16, 5s.; VI. 1, 2, 3, 3s. each; VI. 4, 4s.; VI. 6, 3s.; VI. 8, 4s.; VI. 10, 3s.; VI. 11, 12, 13, 14, 16, VII. 1, 2, 11, 12, 16, 4s. each; X. 15, 6s. 6d.; XIV. 3, 5s.; XX. 3, 4, 4s. each; XX. 7, 3s.; XX. 8, XXIV. 3, XXVI. 10, 4s. each; XXVI. 14, 5s.; XXX. 6, 10, 4s. each; XXX. 13, XXXV. 13, XXXVIII. 1, 3s. each. **Cardiganshire:** II. 3, 4, 7, 8, 14, IV. 12, VI. 10, VII. 7, IX. 8, X. 5, 6, 9, 13, 14, XI. 6, 16, XII. 9, 11, 14, XV. 5, 6, 3s. each. **Carmarthenshire:** XVII. 2, 3, 4, 5, 6, 7, 8, 10, 19, 13, 15, XVIII. 2, 3, 4, 5, 6, 7, 8, XXV. 1, 2, 3, 6, 8, 9, 12, 14, 15, XL. 3, 3s. each. **Devonshire:** XIII. 9, 15, 16, CXV. 1, 5, 6, 11, 12, CXXI. 7, 8, 3s. each. **Area Books:** Buckland Monachorum, 1s. 6d.; Meavy, 1s. **Dorsetshire:** V. 10, XV. 1, 5, XVI. 1, 2, XXVII. 5, 3s. each. **Herefordshire:** VIII. 15, XXIV. 9, 10, 13, XXIX. 2, 13, XXXVI. 1, 3s. each; XXXVI. 7, 4s.; XXXVI. 10 and 11 on one sheet, 14, XXXVII. 16, XXXVIII. 10, 11, 12, 14, 15, 3s. each; XXXIX. 1, 4s.; XXXIX. 14, XL. 1, 5, 6, XLIV. 4, XLV. 2, 3s. each. **Huntingdonshire:** XV. 3, 4s.; XXVI. 1, 3s. **Leicestershire:** III. 9, XXXI. 16, XXXVI. 10, 11, 12, 14, 15, 3s. each; XXXVI. 11, 4s.; XXXVI. 13, 14, XLIII. 9, 3s. each. **Lincolnshire:** VII. 5, 5s.; VIII. 10, XIII. 4, 11, 12, 15, 16, XIV. 14, 3s. each; XXI. 7, 4s.; XXI. 9, XXXVIII. 1, 2, 3, 4, 5, 6, 8, 11, 12, 14, 15, 16, XLVI. 1, 2, 11, 12, 15, 16, XLVII. 1, 11, 14, 15, LXIII. 1, 2, 3, 4, 5, 6, 7, 8, 3s. each; LXXXVI. 7, 4s.; XCV. 6, XCVII. 14, CXIII. 9, 11, 13, 3s. each; CXIII. 15, 4s.; CXIII. 5, CXL. 11, 12, 3s. each; CXLII. 11, 15, 16, CXLIII. 6, 4s. each; CXLIII. 12, 5s.; CXLIII. 14, 4s.; CXLIII. 15, 5s.; CXLIII. 16, 4s.; CXLV. 8, CXLVI. 5, 10, 12, 15, CXLVII. 1, 3s. each; CXLVIII. 2, 4s.; CXLVIII. 3, 3s.; CXLVIII. 4, 4s.; CXLVII. 6, 3s.; CXLVII. 7, 4s.; CXLVIII. 8, CXLVIII. 1, 3s. each; CXLVIII. 3, 4, 6, 7, 8, 9, 11, 14, CXLIX. 5, CLI. 4, 4s. each. **Merionethshire:** XLVII. 11, 3s.; XLVII. 12, 4s.; XLVII. 14, 15, 3s. **Montgomeryshire:** XX. 7, 13, XXV. 11, 3s. each; XXV. 12, 4s.; XXV. 14, 15, 16, XXVI. 3, XXXIII. 3, 4, 8, 3s. each. **Norfolk:** XXI. 15, 3s.; XLIII. 3, 4s.; XLIII. 4, 7, 3s. each; XLIII. 8, LV. 12, LXXX. 3, 4s. each. **Area Books:** Bawburgh, 1s.; City and County of the City of Norwich, 4s.; Costsey, Gringleford, Feltwell, Fornoth St. Peter, Fritton, Hempnall, Methwold, 1s. 6d. each; Morningthorpe, Shotesham All Saints Woodton, 1s. each. **Northamptonshire:** II. 4, 4s. **Radnorshire:** XXXIV. 9, 13, 3s. each. **Rutlandshire:** VI. 8, VII. 16, 3s. each. **Somersetshire:** VIII. 13, XIV. 13, XXX. 10, 4s. each; XXXVII. 6, 7, XXXVII. 8, 4s. each; XXXVII. 10, XXXVIII. 2, 3s. each; XXXVIII. 3, 5s.; XXXVIII. 6, 10, 15, 4s. each; XLI. 3, 4, LXXXIII. 9, 10, 3s. each; LXXXVIII. 1, 5s.; LXXXVIII. 11, 3s. **Warwickshire:** IX. 3, 7, 4s. each; IX. 8, 16, XV. 1, 3s. each; XV. 3, 4s.; XV. 5, 6, 10, 12, 14, 3s. each; XV. 15, 4s.; XVI. 2, 5, 10, 13, 14, 3s. each; XIX. 3, 4s.; XIX. 7, 16, XL. 3, 3s.; XX. 4, 6, 8, 4s.; XX. 9, 10, 11, 3s.; XX. 12, 13, 4s.; XXII. 14, 3s.; XXIV. 3, 4s.; XXIV. 4, 3s.; XXIV. 12, 4s.; XXIV. 15, 16, 3s. each; XXV. 2, 5, 4s. each; XXV. 6, 3s.; XXV. 14, 4s.; XXVI. 16, XLIV. 1, 5, LII. 11, 15, 3s. each. **Wiltshire:** XLIV. 2, LIX. 3, LXV. 4, LXLI. 9, 3s. each. **Worcestershire:** XI. 8, 4s.; XI. 7, XXXIX. 3, 11, 15, 3s. each; XXXIX. 16, XL. 13, 4s. each. **Area Books:** Bewdley, Churchill (near Stourbridge), Kidderminster Borough, Kidderminster Foreign, Stone, 1s. each.

Town Plans—10-foot scale:—

ENGLAND AND WALES: Bideford, XIX. 6, 8, 9, 14; 2s. each. Birmingham and environs, XIII. 12, 6, 9, 12, 15, 17, 20, 21, 22, 23, 24; XIII. 16, 5; LXVIII. 14, 24; LXVIII. 15, 21; 2s. each. Dorchester, XL. 15, 18, 20; 2s. each. Lincoln, LXX. 7, 17; 2s. Totnes, CXXI. 9, 4, 2s.

(Stanford, Agent.)

ASIA.

Siam.—Traverse of the Route from Tavoy to the Boungte Pass into Siam. By E. A. Kenyon, Assistant Superintendent, Telegraphs. Scale 1 inch to 800 feet 1886. Lithographed at the Survey of India Offices, Calcutta, December 1886. 11 sheets.

AFRICA.

Massaua.—Keren, Lula, Asmara e dintorni. Scale 1:300,000 or 4·1 geographical miles to an inch. Col. Ferdinando Hermann de Reichenfeld. Bologna, 1888. (Dulau.)

In some essential particulars this map differs from that of the Italian Military Geographical Institute on the scale of 1:250,000; for instance, the topography in the vicinity of Ghinda bears no resemblance to that previously laid down; then again, the sites of battles have been moved, and taken generally, the whole of the physical features of the country in the interior, as shown on the map under consideration, bear only a slight resemblance to those on the 1:250,000 map. The railway connecting Fort Abd-el-Kader and Saati is shown, and a plan of Massouah on an enlarged scale is given. Roads suitable for horses and camels, and mule tracks are laid down, the condition of the latter, whether good or bad, is indicated by the manner in which they are drawn. On a small inset map the boundaries of Abyssinia are shown.

AMERICA.

French Guayana.—Plan showing the principal Gold Mines in —, 1888. Colonel E. M'Murdo. Scale (approx.) 1:63,000 or 8·6 geographical miles to an inch. W. Wilfred Head & Mark, Litho., London, E.C.

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in January and February 1888.

No.		Inches.	
2154	m	= 20·0	England, south coast:—Newhaven, 1s. 6d.
1142	m	= 3·0	Scotland, east coast:—Firth of Forth, Fisherrow to Queensferry, 2s. 6d.
88	{ m = 14·4 m = 4·9 }		Spain, north coast:—San Sebastian, San Martin de la Arena, 1s. 6d.
2379	m	= 1·4	Black Sea:—Kherson or Dniepr bay, 2s.
1074	m	= 12·0	Bermuda islands:—Approach to Grassy bay and Ireland island, 2s. 6d.
1049	m	= 0·1	Central America, west coast:—Elena bay to San José, 2s. 6d.
1012D	m	= 1·5	Indian Ocean:—Gulf of Aden, with the adjacent coasts of Africa and Arabia between Ras al Khyle and Ras al Hadd. 2s.
6A	m	= 0·1	Indian Ocean:—Gulf of Aden, sheet 1: Eastern portion. 2s. 6d.
6B	m	= 0·1	Indian Ocean:—Gulf of Aden, sheet 2: Western portion. 2s. 6d.

No.		Inches.	
10	m =	various	Gulf of Aden, north shore:—Makástein; Bal-Haf; Ash Shéhr roads; Ras Kossair; Shúkra; Bander Burum; Sharma; Makalleh bay. 1s. 6d.
1009	m =	1·0	Malacca strait:—Approaches to Perak river. 1s. 6d.
2400	m =	1·1	China, east coast:—The bar and approaches to the river Min. 2s. 6d.

(*J. D. Potter, Agent.*)

CHARTS CANCELLED.

No.		Cancelled by.	No.
2154	Newhaven	New plan, Newhaven	2154
114B	Fisherrow to Queensferry .. .	{ New chart, Fisherrow to Queensferry	114B
88	San Sebastian	{ New plans, San Sebastian, San Martin de la Arena	88
2379	Berizan Island to Bug river ..	New plan, Kherson or Dniepr bay	2379
2146	Cape Elena to Cape Desolado ..	{ New chart, Elena Bay to San José	1049
2147	Cape Desolado to gulf of Fonseca		
2148	Gulf of Fonseca to Sonsonate road		
6A	Gulf of Aden, sheet 1.. .. .	{ New chart, gulf of Aden, sheet 1; Eastern portion	6A
6B	Gulf of Aden, sheet 2.. .. .	{ New chart, Gulf of Aden, sheet 2; Western portion	6B
10A	South-east coast of Arabia .. .	{ New chart, Gulf of Aden, sheet 1; Eastern portion	6A
2400	Min river	{ New plan, the bar and approaches to the river Min	2400
2886	Hellgate and its approaches by Long Island sound.		
2815	Kirinde to Julius Nave point.		

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 12. England, south coast:—Shoreham harbour. 1756. Spain, west coast:—Cape Finisterre to Vigo bay. 266. North America, east coast:—Great Egg harbour to Albemarle sound. 1802. South America, north coast:—Surinam to Cabo do Norte. 1931. Central America, west coast:—Gulf of Nicoya. 2431. North America, west coast:—Port Simpson to Cross sound. 100a, b. Africa, north-east coast:—Ras Galwéni to Ras Hafún (2 sheets). 253a, b. Africa, north-east coast:—Jebel Jan to Seyáreh (2 sheets). 8e. Red sea, sheet 5. 10a. Arabia, south-east coast:—Ras Sukra to Palinurus shoal. 10b. Arabia, north-east coast:—Maskat to Ras Sukra. 11. Arabia, north-east coast:—Khorya Morya bay. 813. Ceylon, south coast:—Negomba on the west to Caratievoo on the east. 941a, b. Eastern archipelago, western portion (2 sheets). 18. Australia, north coast:—Port Darwin and adjacent inlets. 1044. Australia, north coast:—Albert river to Cape Ford. 613. Australia, north coast:—Melville island with Dundas and Clarence straits. 2121. New Guinea, south coast:—Freshwater bay to Round head. 916. New Guinea, south coast:—Su-a-u harbour. (*J. D. Potter, Agent.*)

United States Charts.—Pilot Chart of the North Atlantic Ocean, April 1888. Published at the Hydrographic Office, Navy Department, Washington, D.C.

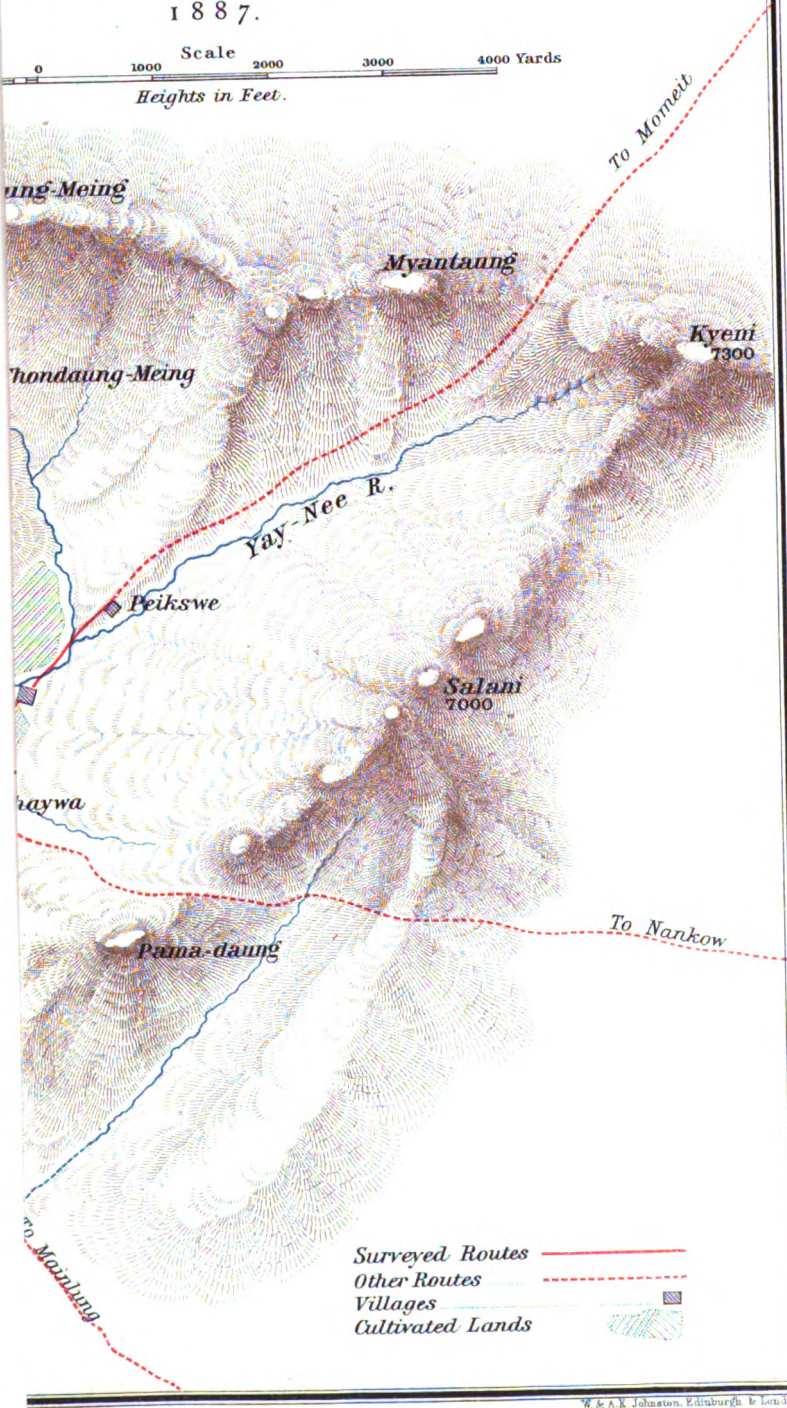
[illegible]

Digitized by Google

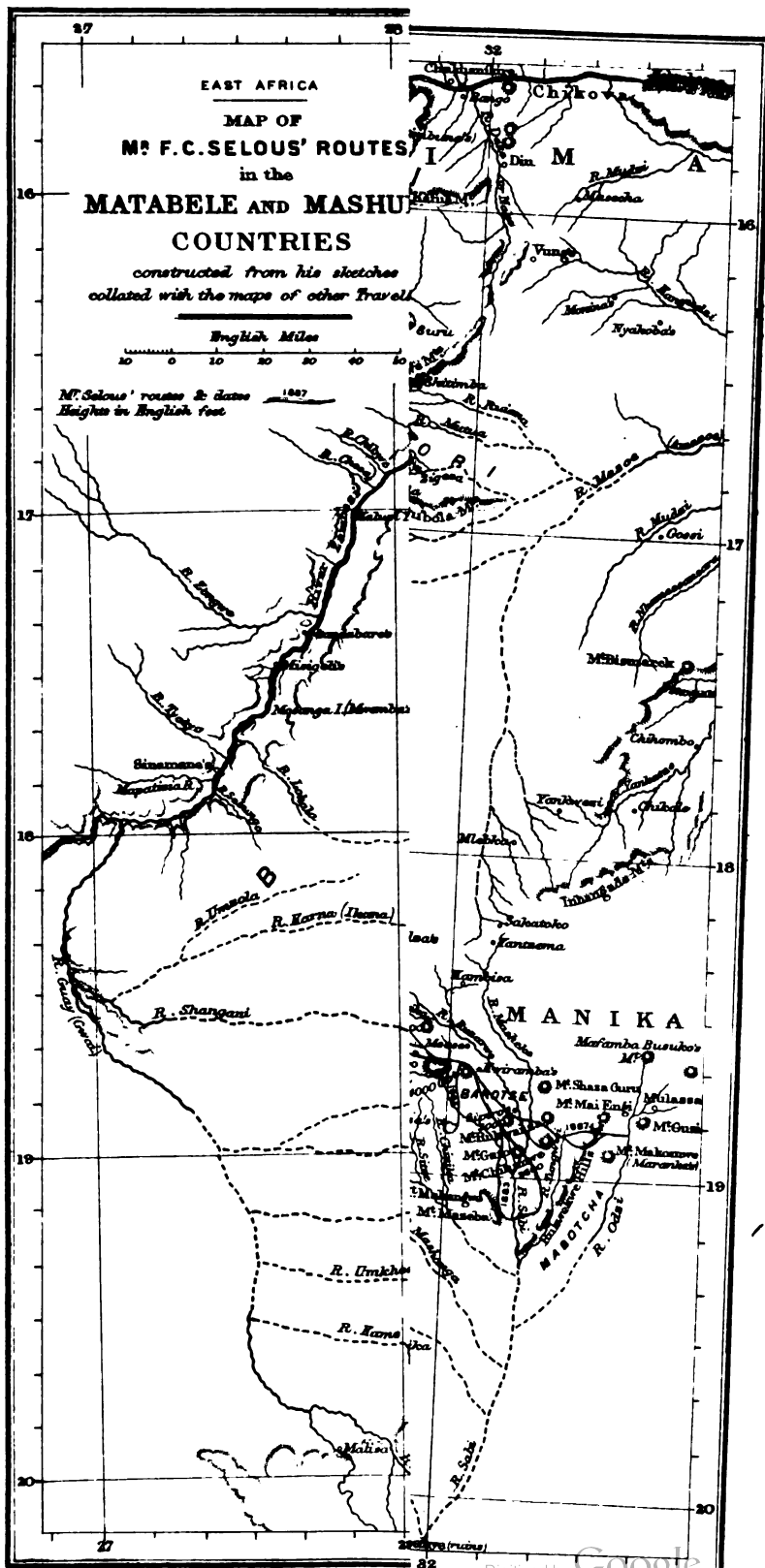
PLAN OF THE
THE DISTRICTS OF BURMA

Surveyed by R. GORDON, Esq., C.E.

1887.



W. & A. K. Johnston, Edinburgh & London.



SAMPSON LOW, MARSTON & CO.'S NEW BOOKS.

NOW READY.

THE LAND OF THE PINK PEARL; or, Recollections of Life in the Bahamas. By L. D. POWLES, late Circuit Justice in the Bahama Islands. 1 vol., demy 8vo, with Map, cloth, 10s. 6d.

The object of this work is to draw attention to an obscure corner of Her Majesty's dominions but little known on this side of the Atlantic, yet not devoid of a special interest of its own, for it was one of the Bahama Islands that Columbus first sighted when he discovered the New World.

ANTIPODEAN NOTES. Collected on a Nine Months' Tour Round the World by WANDERER, Author of "Fair Diana," "Dinner and Dishes," &c. Crown 8vo, cloth, 7s. 6d.

LIGHTS AND SHADOWS OF MELBOURNE LIFE. By JOHN FREEMAN. Crown 8vo, cloth, 6s.

NEAR AND FAR: an Angler's Sketches of Home Sport and Colonial Life. By WM. SENIOR ("Red Spinner"). Angling Editor of the *Field*, Author of "Waterside Sketches," &c. Crown 8vo, cloth, 6s.

TURBANS AND TAILS; or, Sketches in the Unromantic East. By A. J. BAMFORD. Crown 8vo, cloth, 7s. 6d.

"I pity the man who can travel from Dan to Beersheba and cry, 'Tis all barren.'"—STERNE.

THE LAND OF RUBENS: a Companion for Visitors to Belgium. By CONRAD BUKEN HUET. Translated from the Dutch and edited by ALBERT D. VAN DAM, Author of "Famous Bohemians," "Genius en Négligé," &c. Crown 8vo, cloth.

THREE CRUISES OF THE "BLAKE." By ALEXANDER AGASSIZ, Director of the Museum of Comparative Zoology at Cambridge, Mass. Fully illustrated. In 2 vols., 8vo. [May 1.]

The steamer *Blake*, of the U.S. Coast Survey, made three cruises in 1877-78, 1878-79, and 1-80, to the Straits of Florida, the Yucatan Bank, the Gulf of Mexico, the Caribbean Sea, and along the Atlantic coast from Charleston to George's Bank. These volumes give the results of the dredging along the coast and in deep water; describe the contour of the ocean bed, the fauna and the thermic conditions of the sea; and contain a statement of what had been learned from previous explorations, as well as the extensive, varied, and deeply interesting facts ascertained by the three cruises especially reported. The volumes are illustrated with maps, sections, and figures of the deep-sea fauna. The scientific value of the work is amply guaranteed by its authorship.

IN THE PRESS, will be published shortly.

EXPLORATIONS AND ADVENTURES IN NEW GUINEA. By Captain JOHN STRACHAN (of Sydney), F.R.G.S. Crown 8vo, cloth, about 300 pp. With numerous illustrations. Price 10s. 6d.

Now Ready, Price One Shilling.

HARPER'S MAGAZINE. May Number.

CONTENTS:

PART V. OF WM. BLACK'S NEW NOVEL,
In Far Lochaber.
(Begun in January.)

ALEXANDER WILLIAM KINGLAKE. From a Photograph by Elliott & Fry, London. Frontispiece.

LONDON AS A LITERARY CENTRE. First Paper. R. R. Bowker. Twenty-eight Portraits, from Photographs by Barraud, Cameron Studio, Mayall & Company, London Stereoscopic Company, Elliott & Fry, &c.

Matthew Arnold, M.A.—Martin Farquhar Tupper—Philip James Bailey—William Morris—Lewis Morris—Earl Lytton—Jean Ingelow—Christina G. Rossetti—Leslie Stephen—Walter Pater—John Addington Symonds—Frederick Max Müller—Sidney Colvin—Philip Gilbert Hamerton—Herbert Spencer—John Tyndall—Thomas Henry Huxley—Sir John Lubbock—Cardinal Newman—Cardinal Manning—Archdeacon Farrar—Rev. H. H. Haweis—James Anthony Froude—W. E. H. Lecky—Samuel Smiles—W. H. Mallock—Dr. William Smith.

A WINTER IN ALGIERS. Second Paper. F. A. BRIDGMAN. Thirteen illustrations, drawn by F. A. Bridgman.

STUDIES OF THE GREAT WEST.—III. Chicago. CHARLES DUDLEY WARNER.

RUSSIAN CONVICTS IN THE SALT MINES OF ILET'SK. HENRY LANSDALE, D.D., M.R.A.S., F.R.G.S. Fifteen illustrations, from Photographs and Drawings by Charles Graham, W. P. Snyder, &c.

THE ADVENTURES OF TWO MEN. A Story. JULIA D. WHITING.

JUSTICE AND LAW IN RUSSIA. ALBERT F. HEARD.

THE CITY OF DENVER. EDWARDS ROBERTS. Fourteen illustrations, from Photographs by C. C. Wright, Rose and Company, &c.

&c.

&c.

&c.

London: Sampson Low, Marston, Searle & Rivington, Limited, St. Dunstan's House, Fetter Lane, Fleet St., E.C.

MARION & CO.'S PHOTO SUPPLY WAREHOUSE, 22 & 23, Soho Square, London, W.

PHOTOGRAPHIC SETS, ready for use, with full instructions.

FREE LESSONS to Purchasers at our Gallery in Soho Square.

THE EMPIRE SETS, of best finish and material, will stand any climate, either extremes of heat or cold. Made for Plates $6\frac{1}{2} \times 4\frac{1}{2}$, $8\frac{1}{2} \times 6\frac{1}{2}$, 10×8 , 12×10 , and 15×12 .

SMALL PORTABLE CAMERAS of the Detective kind. The Parcel, Metal Miniature, The Academy, and Warwick Brooke's.

ENLARGING APPARATUS, which will enlarge small plates taken by the small Detective Cameras up to 15 or 18 inches. These apparatuses also serve as Magic Lanterns.

BERTHON'S PORTABLE COLLAPSIBLE STUDIO and Dark Room, measuring 16 ft. \times 8 ft. \times 8 ft., weighing 1 cwt. complete, ready for travelling.

BERTHON'S COLLAPSIBLE DARK TENT. Very Light, Roomy, and Portable.

COWAN'S PHOTO DEVELOPING CABINET, complete, with Lead Sink, Tables, Tap, Dishes, Bottles, &c., &c., all complete for work.

CATALOGUES FREE ON APPLICATION.

22 and 23, SOHO SQUARE, LONDON, W.

ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by Colonel H. H. GODWIN-AUSTEN, F.R.S., J. K. LAUGHTON, M.A., and DOUGLAS W. FRESHFIELD, M.A. Contents: Hints on Surveying and Astronomical Observations. John Coles, F.R.A.S.—Meteorology. R. Strachan, F.M.S.—Geology. W. T. Blanford, F.R.S.—Natural History. H. W. Bates, F.R.S., Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.—Anthropology. E. B. Tylor, D.C.L., F.R.S.—Photography. W. F. Donkin, M.A.—Medical Hints. G. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department.—General Outfit. Colonel J. A. Grant, C.B., Edward Whymper, and others. Price, in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, W.; and to be had of Edward Stanford, 55, Charing Cross, S.W.

Instruction for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. Surveying and Mapping, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. Geology, including practical training in the field. By Mr. W. Topley, of the Geological Survey; President of the Geologists' Association. 3. Botany. By Mr. N. E. Brown, of the Herbarium, Kew. 4. Photography. By Mr. John Thomson, Author of 'Photographic Illustrations of China and its People,' and other works.

The lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2s. 6d.

Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers, Vol. II. Part 2.—Now Ready.—CONTENTS:—A Bibliography of Algeria. By Lieut.-Colonel Sir ROBERT LAMBERT PLAYFAIR, K.C.S.I., H.M. Consul-General, Algiers.

* * * Fellows who have not applied for the Parts as published, can have Vol. I. complete by applying at the offices of the Society, 1, Savile Row, W.

VOL. X., No. 6.
New Monthly Series.]

JUN 18 1888
JUNE, 1888.

[To Non-Fellows,
PRICE 1s. 6d.]

PROCEEDINGS

OF THE

Royal Geographical Society

AND

Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE		PAGE
SUANETIA. By DOUGLAS W. FRESHFIELD,		GEOGRAPHICAL NOTES	378
SEC. R.G.S.	325	OBITUARY	385
EXPLORATION OF THE SOLOMON ISLANDS.		REPORT OF THE EVENING MEETINGS	388
By C. M. WOODFORD	351	PROCEEDINGS OF FOREIGN SOCIETIES	388
EXPLORATION OF ROUTE BETWEEN		NEW GEOGRAPHICAL PUBLICATIONS	394
ASSAM AND UPPER BURMA	377	NEW MAPS	400

MAPS AND ILLUSTRATIONS.

USHBA	340
CENTRAL GROUP OF THE CAUCASUS	404
A SPUR OF THE CAUCASUS	404
THE SOLOMON ISLANDS	404

LONDON: EDWARD STANFORD, 55, CHARING CROSS, S.W.
 PARIS: ANDRÉAU-GOUJON.
 VIENNA: AETARIA & Co.
 HAMBURG: L. FRIEDRICHSEN & Co.
 ST. PETERSBURG: WATKINS & Co.
 MANCHESTER: JOHN HETWOOD.
 EDINBURGH: DOUGLAS & FOULDS.
 DUBLIN: HODGES, FOSTER & Co.
 BERLIN: D. REIMER.
 LEIPZIG: F. A. BROCKHAUS.
 NEW YORK: SCRIBNER & WELFORD.
 PHILADELPHIA: LIPPINCOTT & Co.
 MELBOURNE: GEORGE ROBERTSON & Co., LIMITED.

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR	"
KURRACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

SUMMER TOURS IN SCOTLAND.

GLASGOW and the HIGHLANDS.

(Royal Route via Crinan and Caledonian Canals.)

Tourists' Special Cabin Tickets issued during the Season, valid for six separate or consecutive days' sailing by any of Mr. Macbrayne's Steamers, £3.

THE ROYAL



MAIL STEAMERS

Columba, Iona, Fusilier.	Chevallier, Grenadier, Gondolier.	Mountaineer, Pioneer, Glengarry.	Glencoe, Claymore, Claraman.	Clydesdale, Lochawe, Linnnet.	Lochiel, Inveraray Castle, Cavaller.	Handa, Islay, Fingal.	Mabel, Lochness, Ethel.	Gladiator, Udea.
--------------------------------	---	--	------------------------------------	-------------------------------------	--	-----------------------------	-------------------------------	---------------------

Sail during the season for Kyle of Bute, Ardrishaig, Oban, Ballachulish (for Glencoe), Fort-William, Banavie, Inverness, Staffa, Iona, Lochawe, Islay, Tobermory, Portree, Strone Ferry, Gairloch, Lochmarea, Ullapool, Lochinver, Lochmaddy, Tarbert (Harris), Stornoway, Thurso, Loch Katrine, Loch Lomond, the Trossachs, &c.; affording Tourists an opportunity of visiting the magnificent scenery of Glencoe, the Cuchulin Hills, Quirang, Loch Coruisk, Loch Scavaig, Lochmarea, the Falls of Foyers, and the famed Islands of Staffa and Iona. OFFICIAL GUIDE, 3d.; Illustrated, 6d.; Cloth Gilt, 1s. Time Bill, with Map and Fares, Free by Post from the owner,
DAVID MACBRAYNE, 119, HOPE STREET, GLASGOW.

LUXURIANT GLOSSY HAIR

Is assured to those who discard poisonous hair restorers and dyes and cheap oils, which produce eruptions on the scalp, and use

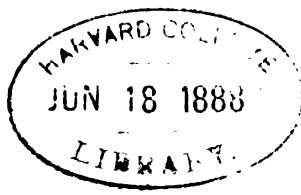
ROWLANDS' MACASSAR OIL,



Known for nearly 100 years as the best Preserver and Beautifier of the Hair. It contains no lead or mineral ingredients, and can now also be had in a
GOLDEN COLOUR for fair-haired children.

Sizes, 3s. 6d., 7s., 10s. 6d. (Family bottles equal to 4 small).

Ask Chemists for ROWLANDS', and avoid cheap worthless imitations under similar names.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Suanetia : *

By DOUGLAS W. FRESHFIELD, SEC. R.G.S.

(Read at the Evening Meeting, March 12th, 1888.)

Map and Illustration, p. 404.

THE Alps can never be exhausted—except to the tourist or the topographer. Yet they can hardly be to another generation what they were to their discoverers, to the men who thirty years ago joined to fill up a gap in the maps of Central Europe, to explore the fastnesses of Tyrol and Dauphiné, to survey the chain of Mont Blanc and the Graian Alps, the untrodden snow-fields of the Orteler, the Adamello, and the Zillertal-ferner. The record of their work is to be found—not in the publications of this Society, which has at times passed over very lightly the geography of our own continent—but in recent Government surveys, in the articles of von Sonklar, Payer, and other distinguished geographers in ‘Petermann’s Mittheilungen,’ in Mr. J. Ball’s ‘Alpine Guide,’ and in the numerous publications of the Alpine Societies, which now number in Europe over 50,000 members, and dispose of an annual income exceeding 20,000*l*.

The task of Alpine exploration, when once seriously taken in hand, was vigorously pursued. Although scientific problems must always remain to be worked out in every great mountain chain, our knowledge of the Alps so far as mere topography is concerned is complete, or on the verge of completion.

A new recreation ground is wanted for those of our countrymen who, without being travellers by profession, find pleasure and refreshment in rough travel among primitive people, in mountain scenery and glacier air, in that sense of adventure and discovery which is afforded only by unknown countries, or virgin heights and an unmapped snowy chain. To such travellers—or vacation tourists—I offer the Caucasus.

* I have throughout as far as possible Anglicised and simplified the spelling of native names, avoiding the French *ou* and the German *sch* or *tech*.

No. VI.—JUNE 1888.]

2 A

Here, if they make a hobby of map-construction and correction, or of any branch of natural science, or of linguistic and ethnological studies, they will find a field for much useful work. At any rate they may enjoy themselves, and while they do so they can hardly fail to increase knowledge. The country has been brought well within the reach of vacation tourists, of every one with a two months' holiday. Professional geographers, perhaps, are apt to think slightly of vacation tourists: but even the African lion may be aided by a mouse! Mr. Galton himself once edited several excellent volumes of vacation tours.

Nineteen years ago I described to the Geographical Society the first journey of exploration made by mountaineers, in the technical sense of that word, in the Caucasus, the ascents of its two most famous peaks, Elbruz and Kazbek, and the general character of the snowy chain that connects them. It is not likely that any reader of this paper remembers what I then said and printed. But much of it has passed—mainly through an excellent article by Mr. E. Bunbury in the last edition of the 'Encyclopædia Britannica'—into handbooks of geography. Much has passed, but not all; for it is hard to uproot established errors, and the errors about the Caucasus were at one time both widespread and manifold.

In July 1887, in the company of M. de Déchy, an Honorary Corresponding Fellow of the Society, and with Alpine guides, I revisited this noble chain, twice crossed some of its greatest glaciers, climbed several of its peaks, and penetrated many hitherto unknown recesses. In the course of these wanderings the maze of the central group was unravelled, and several orographical problems which had puzzled intermediate travellers received their final solution. I have, in part from these personal experiences, in part from careful study and collation of the photographs taken by M. de Déchy in three previous journeys (1884-6), been able to form a tolerably close and complete picture of the region above the snow-line, of the "Peaks, Passes, and Glaciers," of the Central Caucasus.† The outlines of this picture I laid before the Society in March last. But I prefer to delay the publication of that portion of my paper until I am able to fill in several more or less important gaps in my own knowledge. During the next few months Alpine explorers will, I trust, make some fresh discoveries. These, together with the valuable new measurements in course of communication to me from General Shdanov, the Director of the Map Department at Tiflis, I desire to incorporate at leisure in a general sketch of the central chain, and particularly in the map which should accompany it.

For the moment, therefore, I propose to limit myself to some notes on the scenery and people of a single district of the Caucasus, the mountain-

* 'Journal R.G.S.' vol. xxxix.

† M. de Déchy has presented to the Royal Geographical Society selected specimens from these photographs. See also his 'La Souanétie Libre,' Buda-Pest, 1886.

girt basin of Suanetia, and one or two sketches of travel among its glaciers and snow-fields.

Suanetia (excluding Dadian's Suanetia, of which more hereafter) is the upper basin of the Ingur, a river which flows into the Black Sea a few miles east of Sukhum Kaleh. It is about the size of the valley of Aosta, 40 miles long by 15 broad. It lies between 3000 and 7000 Suanetia.

feet above the sea. On its north run the snowy ramparts of the Caucasian crest, enclosing in their complicated ridges four great glacier basins (those of the Zanner, Thuber, Gvalda, and Betsho glaciers), and sending down more directly towards the Ingur or its tributaries many ice-streams, such as the Adish, which would be ranked in the Alps as glaciers of the first class. These ridges are composed of crystalline rocks, which show the tendency observable in the Alps (e.g. in the Mont Blanc and Pelvoux groups) to arrange their summits in double lines, in the troughs between which lie vast *névés*. This structure has been grotesquely misrepresented in the small map, based on the 5-verst Russian survey, of the chain north of Suanetia published both in the French and English editions of Reclus's '*Géographie Universelle*.' On either flank of the rigid granites lie beds of friable schists, whose green rounded outlines afford a striking contrast to the snowy precipices of the great chain on which they abut.* On the south Suanetia is fenced in by the lofty slate ridge of the Leila, which, running parallel to the main chain, attains over 12,000 feet, and bears very considerable glaciers towards its western end. In this direction the river escapes, between high spurs of the two chains, through a narrow porphyritic gorge, which is not at present passable for horses. On the east a low grassy down (8600 feet), only 1600 feet above the highest villages, leads into a pathless maze of forests and flowers—the wilderness in which the Skenes Skali, a tributary of the Rion (the ancient Phasis) has its sources. But so circuitous is this outlet, that Russians and natives have both preferred the higher and much steeper Latpari Pass (9200 feet), which is the usual road into the valley. Within these ridges and gorges the inhabitants have lived for centuries isolated from the outer world, forgetting and forgotten.†

They are first mentioned by Strabo, under the name of Soani,‡ as a powerful nation; but Suaneti, as far as I could learn, is what they now

* For detailed observations as to the geology of the district see Abich's '*Voyages en Transcaucasie*,' Moscow, 1865, E. Favre's '*Recherches Géologiques dans le Caucase*,' 1875, and Iljin's papers in '*Petermann's Mitteilungen*' for 1884.

† I shall enter into detail as to the glacier passes in a subsequent article on "*The Peaks, Passes, and Glaciers of the Caucasus*."

‡ The statement in the received text that they could muster 200,000 fighting men must surely be a copyist's error. Even on the supposition that the Soani gave their name to a confederation of Colehian tribes the figures would be hardly credible. Strabo states that the Soani had a king and a council of 300, and used poisoned weapons in war. Procopius calls the country *Souania*.

call themselves. It is perhaps worth remarking that both Suanetes and Consuanetes appear in the catalogue of the Alpine tribes subdued by Augustus, inscribed on the Trophæum which still shows its "Roman strength" on the heights of Turbia. At the last census the Suanetians numbered about 12,000. Over one-third of the race, known from the native prince who ruled them as the Dadian's Suanetians, live on the upper Skenes Skali. They have been more or less merged in the surrounding Mingrelian populations. In the upper basin of the Ingur the remaining Suanetians found the Sanctuary of the Caucasus. I use Sanctuary in the sense, not of an abode of saints, but of a place of refuge for criminals. It remains for some competent student to write a monograph on the Suanetian communities, indicating the foreign elements mixed up with the original stock. I can only mention these facts. Among the people of Lachamuli, the lowest village, there are many Jews who carried on trade with the lowlands. At Betsho a few Mahomedan Tartars were established. At Mulach several Cossack families, deserters from their posts on the old frontier of Circassia, have found a refuge. The villages at the lower end of the valley fell under the control of a native family, said to have been of extraneous Kabardan origin, known as the Dadish Kilians; but the territory of the upper communities, was at the time of the Russian occupation and is down to the present day, distinguished as "Free Suanetia."

On the history, such as there is, of this people, I must not linger.* They are mentioned by Pliny and Procopius. Their country was reserved by Chosroes for Persia in his treaty with Justinian.

History. It was converted to Christianity before the tenth century, and covered with small chapels or churches. Seven hundred years ago it formed part of the kingdom of Queen Tamara, the heroine who occupies the place of Alexander or Charlemagne in Georgian legend; the greatest of their *kings*, as, anticipating the Hungarians' compliment to Maria Theresa, Georgian chroniclers term her. The Suanetians still chant ballads in her honour, recounting how she led them to victory over their neighbours the Abkhasians and Tartars, and what was better still, reduced their taxes to the nominal sum of an egg per household.†

Suanetia soon fell off from the Georgian kingdom. After a period during which it was connected with Mingrelia, it became, at some time in the last century, completely unattached. Since that time the district has enjoyed perhaps as complete a form of communal home rule as could be desired by the most enterprising politician in search of an example of decentralisation logically carried out to its extreme limits. Each com-

* The standard authority for Georgian history is the chronicle compiled between A.D. 1708-21 by order of King Vakhtang of Georgia. It has been translated into German by Klapproth, and is analysed by Dubois de Montpéroux in the second volume of his work on the Caucasus.

† Radde, 'Drei Langenhochthäler Imeritiens,' Tiflis, 1867

munity is made up of several villages. The village, or cluster of fortified houses, consisted—according to Prof. Kovalevsky—of members of the same family or *gens*. Now the village generally includes several families. Members of the same family cannot intermarry. The community proved too large a unit. Thus when Dr. Radde in 1864 was at Ushkul some men of Murkmur shot at everybody who came down the path from Chubiani, two contiguous hamlets belonging to the same community. As if life were not already sufficiently exciting, public enmity was supplemented by countless private feuds and vendettas. Women and pasturage rights were the occasion of most of them. When a woman changed hands or husbands, the parties concerned could not always agree on the value in cattle—the Suanetians had no money—of the lady exchanged. Hence arose assaults of persons and batteries of towers. The affairs of the hamlet, so far as they were not settled by appeals to arms, were regulated by an assembly of all adult males, in which unanimity was required for a valid decision. The minority probably often saw good reason for yielding—such reason as the schoolboy sees who is asked whether he will do this or that, or “take a licking.”

The foreign relations of the Suanetians consisted for the most part in predatory excursions into their neighbours' pastures. They were arrant sheep-stealers and cattle-lifters. The great glaciers of the main chain, and passes of the nature of the Col de Collon, or the Col d'Hérens, were no obstacle to these sturdy thieves. The Tartars of the north side were forced to keep a guard to protect their flocks and herds on the upper pasturages. I saw myself, in 1868, stolen oxen being driven over the Dongusorun Pass (10,900 feet), and Dr. Radde recounts the robbery of a flock of five hundred sheep by the Suanetians of the Skenes Skali.

Strangers met with no hospitality. On the contrary, it was the custom to exact a payment from them for passage, and the custom still survives in petty demands made for halting in a remote village.

The Suanetians may fairly be described as reverted pagans. Some Christian rites, fasting in Lent, the use of the sign of the cross, they have doubtless preserved. But these survivals seem to me no more to entitle them to the name of Christians than our own midsummer-night fires constitute us sun-worshippers. Such at least was the view of the Russian Government and of Dr. Radde. He describes, in the work I have often quoted, how the *pagan* inhabitants of Adish were converted in 1865. The Russians treated them much as the legends of the Trentino assert Charlemagne to have treated the inhabitants of the Italian Alps—they baptised them wholesale.* The country is covered with small

churches and chapels, dating probably from the 11th and 12th centuries,† built, unlike the houses and towers, of regularly squared blocks of limestone; the apse is sometimes ornamented

* Freshfield's 'Italian Alps,' Appendix D.

† See plates in M. Bernoville's 'Suanétie Libre.'

externally with carving, or an arcade of columns in low relief. The bells, as in Corsica, are suspended to a wooden frame outside the church. The altar-screens are arranged as in Greek churches. The interior is frequently frescoed. The architecture, such as there is, is Georgian—that is, Romanesque in structural features, Persian in decorative detail. The frescoes at their best resemble Giottoesques, at their worst are bad, barbarous Byzantine.

Long before Suanetia had obtained home rule, it had advanced to church disestablishment. The priests disappeared, and their place was taken by an hereditary caste of local elders, who superintended the funeral feasts and sacrifices. The ecclesiastical property was secularised; a village vestry assumed its control, and kept the key of the church, which, no longer reserved for pious uses, served principally as a treasure house. Inside in heavy chests were stored the sacred books and images, some of them beautiful works of art (figured in M. Bernoville's and M. Chantre's works), Persian silks, strange three-sided pieces of wood carved with old Georgian inscriptions, flint-headed spears and arrows, dozens of horns of the Caucasian *tur*. These things are still kept locked up, and it is almost impossible for any stranger to see them. My account comes chiefly from a gentleman who obtained access through travelling in the train of the Bishop of Poti, who last year ventured on a visit to this remote corner of his diocese.

The priests having been disposed of, services and sacraments naturally went too. Marriage consisted in sewing together the garments of the bride and bridegroom; baptism was travestied; the ancient funeral ceremonies were revived or continued. Of these Professor Kovalevsky furnishes me with the following description:—One of the nearest relations of the deceased follows the body to the grave, leading by the horns a fat ox. Immediately after the burial the ox is killed, and the heart and liver are placed on a wooden platter. This is taken by one of the local elders (who are not consecrated or in any way recognised as priests by the Georgian Church), who lifts up the plate, using at the same time the following words:—"O God, accept this our sacrifice." The portions so dedicated he keeps for himself. The rest of the animal furnishes the funeral banquet. A year after the death a commemorative feast is held at the grave. The relatives bring cheesecakes, portions of meat, and the spirit locally made from barley. These the ghost is supposed to need on its journey. They are blessed by the elder, and, as before, kept by him for his own use. Every year after the harvest there is, as in Roman Catholic countries on All Saints' Day, a general commemoration of the dead, and large offerings of food are made to the elders. I witnessed a similar festival among a Mingrelian population at Gebi, on the Upper Rion. There the ox was cut up in the churchyard outside a new church, and the offerings were blessed by a priest appointed by the Russian Government. This may well have been a renewal of some pagan sacrifice on the tombs of ancestors. Many graves surround the churches.

But others are found under particular trees. It is obvious that tree-worship survives in Suanetia.* In the centre of many hamlets there is a venerable tree or trunk—walnut (*Latal*), birch (*Mestia*), cherry (*Nenjar*)—under which stand two or three rude stone chairs. Doubtless these are old places of assembly.

The people are said (on the authority of a Mingrelian priest) to venerate the heavenly bodies.† As will be seen presently, the Suanetians who carried our goods over the chain appeared to pray to and praise the sun directly. They do no work on Friday, Saturday, or Sunday, thus partially making up for other shortcomings by keeping the Sabbaths of three religions.

The Suanetians had home rule, and church disestablishment with disendowment. They had solved another pressing problem. They had, without emigration, overcome the natural tendency of the population to increase beyond the limits their territory would support. They had even caused it to diminish. Their system was simple and effectual. They put a pinch of ashes at birth into the mouths of all superfluous female babies. They took a masculine view of superfluity. At the last census there were four males to three females in the Ingur valley.

Poetry where it exists, above all primitive poetry and local ballads, often gives a nearer insight into the condition of life and manners of a race than religious rites and beliefs. The one is indigenous, the others as a rule are exotic. Dr. Radde has fortunately preserved several very curious Suanetian ballads, such as are still sung under some ancient tree, or on the march along the mountain path. They celebrate the golden time of Thamara, past forays across the great chain into the lands of the Baksan Tartars (the name of a glen at the foot of Elbruz, Terskol, occurs in one), or among the Abkhasians to the west. The following ballad, which records the fate of a hunter—an early “mountaineering accident”—gives so lively a picture of Suanetian manners, that I cannot resist venturing on a rough translation.

Metki was a hunter of Pari, in Dadish Kilian's Suanetia. He became the lover of the Mountain Spirit. It appears from Dr. Radde's version that besides being married, he was also in love with his sister-in-law, and that to the latter he revealed the secret of her mysterious rival. How the Spirit revenged his indiscretion, Metki, or rather Metki's ghost, tells as follows:—

* There is in an otherwise bare landscape a very remarkable grove of ancient beeches, surrounding an ancient pilgrimage church near Forno, at the head of the Val Grande, the northernmost of the Valli di Lanzo in Piedmont. Probably research might lead to the discovery of other instances in the Alps where pagan groves have been sanctified by later use. The source of the Po is still an object of pilgrimage to thousands of Piedmontese peasants in the month of September. The signs of the village inns at Crissolo, the highest hamlet, illustrate the transference or rather confusion of worship. They are, “Ai Sorgenti del Po,” “Alla beata Vergine.”

† Bernoville's ‘Suanétie Libre.’

"Metki is unhappy and to be pitied. The men of Lentechi were assembled for the dance. Into the circle of the dancers sprang a white hare; after running round the circle it sprang between Metki's feet. Metki said to his fellows, 'Remain you quiet here, this has never happened to me before. I must follow the tracks of the hare!'

"High in the valley are the tracks. I came to a place where the mountain goats live. I came to the steep rocks. The white hare was transformed into a white mountain goat. Metki clung with the right hand and the left foot to the steep rocks. There came a neighbour from the same village, and he lamented when he saw how Metki hung, and heard how Metki spoke :—'Once on a time I wounded you, remember that no more, but carry the news of my misfortune. Tell my father I fell from here, from the wild goats' dwelling. Let him make ready wine with honey, and feast the neighbours; and bid my mother that for the repose of my soul she give to the folk bread and cheese and millet; and bid my wife that she bring up the children well, and my sister that she cut short her hair, and my brothers that they take good care of the house and live not in enmity. Bid my friends when they bewail me that they sing true in the chorus. Bid my Thamara that she meet me at the foot of the mountain, that she go quickly on the level path, and climb weeping to the mountain.

"Over me flutters the raven, he craves my eyes for his meal. Under me, at the foot of the mountain, waits the bear who shall eat my flesh.

"The star Venus is my enemy!

"Venus rises, and the day and the night part asunder. May my sins rest on the Mountain Spirit. O Spirit, save me, or let me fall quickly into the gulf.'

"As the red of morning shone, and the day and night were parted, Metki fell; but all his misdeeds shall rest on the Spirit of the Mountains."

In this strange and interesting political and social condition Suanetia appears to have remained for more than a century. Off the world's highways and the world's contests, the Free Suanetian communities went on turning, like the earthen pot, round and round in their own rock-girt pool, until they were swept at last into the stream of the nations.* In 1833 Russia assumed suzerainty over the district. As years went on, the suzerainty became more than nominal. The Suanetians at first did to their new rulers as they had been accustomed to do to their neighbours. A Suanetian prince, the Dadiah Kilian of the Lower Ingur, in 1857, assassinated the governor of Kutais and three other officials. In 1869, the year after my first visit, the Governor of Mingrelia, Count Levershoff, made a tour through the district with

* May not some confused report of Suanetia be the origin of the fable of Hanyson (Soany?), the land of perpetual darkness and crowing cocks of Sir John Maundeville?

an armed force. The villagers collected to resist him, and it was only by tact and good luck that a collision was avoided.*

Captain Telfer—one of our best recent authorities on the Caucasus, although his work has been most unaccountably ignored abroad—has given a full account of his visit to the district with a Russian official in 1874.† In 1875–6 there were further disturbances culminating in a partial revolt, confined however to one or two villages, and the murder of a Russian officer. The Government inflicted an adequate, but by no means excessive retribution, made a great many good resolves as to new roads and other measures, and tightened to some extent, as it might well have done earlier, the reins of administration. It has appointed responsible headmen or *starchinas* in every commune, has sent more village priests, has established several schools, erected sheds or court-houses where travellers can find shelter, and has placed its representative at Betshe in a position to command a certain amount of respect and obedience. The framework of local government has thus been laid down. But the machinery is naturally still rude and ineffectual. Thus, at Ushkul the *starchina* does not understand a word of Russian, and the official documents he receives are carefully preserved, unopened and unread, in one of the church chests! A thief from Adish (formerly so notorious a robber's den that in 1864 Dr. Radde did not dare to pass through it by daylight) stole from our camp last summer what he could lay hands on under cover of night and storm. But this was an exceptional experience; Russian justice speedily overtook the culprit, and the offence is less likely to be repeated. I walked about last year alone and unarmed by day and night all over the hills, as freely as I should in Switzerland. A change is slowly coming over the people: schools, perhaps the only effectual civilisers, are doing their work. At Mestia I entered the schoolhouse. It was holiday time, and I could only notice the pictures with which the walls were decorated. Among these were a chart of the heavenly bodies, another of common objects of civilisation, novelties most of them to these young barbarians, and a woodcut of the murdered Tzar lying in state. Everywhere I noticed in the rising generation an absence of the wild-animal expression which was the characteristic of the Free Suanetians twenty years ago, and which all travellers have observed; and in several villages a small boy, by his knowledge of Russian, was able to serve as interpreter between the *starchina* and ourselves.

The Suanetians are not, as M. Chantre alleges, mainly a pastoral people. They keep a few flocks of sheep and herds of horses. Bullocks are used to draw sledges, and are eaten in winter. But flocks and herds are seldom found, as among the Tartars beyond the chain, on the high

* See Bernoville's 'Souanétie Libre' for a full and interesting account of this quasi-military promenade.

† Telfer's 'Crimea and Transcaucasia,' 1876. See also 'Edinburgh Review,' No. 297.

pastures, and consequently there are often no paths to them. To reach the upper glacier basins you must find and follow almost untraceable hunters' tracks. Pigs, the smallest breed I ever saw, and geese wander round the homesteads, which are guarded by dogs. The villages are surrounded by barley-fields fenced in with neat wattling. The paths between them are pleasant, and less stony than most Alpine mule-roads. The inhabitants have learnt to cultivate potatoes and other vegetables. They cut a certain amount of hay on the high pastures. Sometimes they cross the chain in summer, and let themselves out as labourers to the indolent Tartars, just as the Lucchesi do to the Corsicans. But there is no love lost between them. The Mussulmen look on the Suanetians with contempt as pig-eaters. I heard the Suanetians hiss "Cherkess" at our Kabardan Cossack; and the Cossack—a mild amiable creature, the reverse of the popular idea of a Cossack—despised and distrusted every Suanetian from the bottom of his soul. A race-hatred of centuries was recognisable in its ashes.

It seems to me difficult to say anything definite as to the prevalent type among the Suanetians. *Variety* is the marked characteristic. One Type of village headman (Mestia), huge and bull-like, was like a population. figure from an Assyrian monument. Of the three men who led our baggage horses from Ushkul one wore the clothes, and had something of the air and manners of a Persian gentleman. He walked in a pink cotton frock-coat, wore a turquoise ring, and had his ears pierced. Another was a splendid, good-tempered, fair giant. Fair men with tawny beards are common. The third was a tattered, dark, stumpy, noisy barbarian. The ordinary costume is the brown frock-coat with cartridge pouches on the breast of the Caucasus, and on the head either an Ossetian flabby wideawake, or a *bashlik*, or one of the tiny pieces of cloth, like kettle-holders, commonly worn in Mingrelia. The women at Ushkul have one rough sheet of sacking for clothing, and are shy. In other villages they wear the red robes common in this part of the Caucasus. At Latal they are very forward, and wear flounced petticoats, such as might be seen in a back street of Genoa. Some one may start a theory that the Latal ladies are the descendants of refugees from one of the Genoese colonies on the coast destroyed by the Arab invasion! One per cent. of the population are said to be goitred.

The Suanetian language resembles the Early Georgian into which the Bible was translated. It closely resembles also the dialects spoken by neighbouring highlanders, such as the Pshavs, Chevsurs, and Tushins.

Language. H.B.M.'s able and active Consul at Batum, Mr. Peacock, has prepared a limited vocabulary of the Georgian, Mingrelian, Laz, Suanetian, and Abkhasian dialects for the Royal Asiatic Society.* Even a hasty glance shows that the first four tongues have many words in common, while the Abkhasian seems to stand absolutely apart

* 'Journ. of the R.A.S.,' vol. xix. part 1. See also Dr. Radde's and Captain Telfer's works already quoted.

from all of them.* The problem that has been discussed is,—Are the Suanetians—so far as they are not merely a mixture of refugees who have found shelter at different times in this Mountain Alsatia—of the Georgian stock, or do they belong to some primitive Colchian race? The first view is taken by Radde and Kovalevsky, the second by Bernoville, whom M. Chantre copies in the short notice contained in the encyclopædic and splendidly illustrated work noticed in the last number of the ‘Proceedings.’ I have no doubt myself, and the linguistic argument seems enough to settle the question, that the former view is correct. Possibly the latter rests on a misapprehension, and there was no separate Colchian race distinguishable from the Georgian.

After its natural beauties, its peaks and forests, what first strikes the traveller in Suanetia is the local architecture. The castellated villages which lawlessness has produced are as prominent in Architecture.

his eyes as the castles of the robber barons are to the Rhine tourist, or the towers of San Gimignano—to take a closer parallel—to those who wander in Italian byways. Nothing more strangely fantastic can be imagined than these towered hamlets. Mestia alone has seventy towers 40 to 80 feet high, Ushkul about fifty, and two castles besides. Let me try to describe from a sketch a street-scene in Chubiani, one of the hamlets of Ushkul, 7000 feet above the sea. The house is a square block built of irregular pieces of slate and slate-roofed. The only windows are small holes, high up, and unclosed. The smoke escapes through the roof. Birchbark torches are used at night. A wooden passage, capable of being cut down in case of emergency, leads to the tower of refuge. Let us enter the house: it consists of one large ill-lighted room; two or three rude stones form the hearth; there are a few rough wooden benches and stools on the earthen floor; in the corner is a raised wooden platform with skins and cushions, the family couch. Groping up a dark passage, we reach the tower. Ladders, easily removable, lead from storey to storey. The ladders are short, and to gain each storey one is compelled to scramble up projecting stones left in the wall. Skulls of wild goats (*Capra Caucasica*),† and other odds and ends, lie about on the landings. On the top storey are loopholes for firing. These towers, unlike the churches, are built of untrimmed black

* M. Chantre prints a very poetic legend purporting to account for the absence of any written form of the Circassian dialects. A learned Adighè or Circassian, an Arabic scholar, sat down to endeavour to make an alphabetical representation of his native tongue. He had not proceeded far when his labours were interrupted by the sudden appearance of a venerable figure. The stranger addressed him to this effect:—“Give up your hopeless task. Can you put into human writing the rolling of the thunder among the peaks, the crash of the falling avalanche, the deep roar of the mountain torrents, the blast of the waterfalls? Can you represent the sounds of the stones as they clatter down the gorges, of the branches of the forest as they moan in the tempest, the screams and songs of the birds as they call to one another from height to height? How then can you hope to imprison in letters the free speech of the tribes of Circassia?”

† Dr. Radde saw thousands in the church at Ushkul.

slates, generally whitewashed. At Ushkul, however, there are two castles, one 50, the other 500 feet above the village (attributed of course to Queen Thamara), in which the black slate has been left its native colour. In the lower castle I found a ruined chapel. The higher castle commands a view of the pass to the upper Skenes Skali, and must have been the defence of this entrance to the valley. I was fortunate in meeting at Ushkul a very intelligent man, M. Bussarion Nichoradse, a native of the place, who has been educated by the Government and is now a schoolmaster at Kutais. He told me that in ancient times all the families in a village were bound to assist their neighbour who was building a tower, but that no new towers had been raised, though many had been repaired, within his memory. A somewhat similar custom existed in the present generation at Chamonix, as François Dévouassoud, my Alpine guide, reminded me. When any member of the commune was building a house, his neighbours after mass on Sunday would contribute each a few hours' labour to his erection.

Scenery, perhaps, ought to have come before architecture, the landscape before the incident in the foreground.

'Savage Suanetia,'* the title chosen by an enthusiastic sportsman for the most recent description of this district, although in one sense appropriate, seems to me, so far as nature is concerned, singularly unhappy. Smiling—sylvan; such are the epithets that come naturally to the traveller's lips as he suddenly emerges from the icy recesses of the Caucasus into a region of wooded hills, gentle slopes, sunny meadows, and neatly fenced barley-fields. Compared to the warrens or stone-heaps which serve the Tartars of the northern valleys for dwellings, even the towered villages have at a distance a false air of civilisation. North of the chain the traveller is frequently reminded of the sterner valleys of the Pennine Alps, or even of Dauphiné. Here the hill-shapes recall Savoy—Contamines and Mégeve; but the forests show softer and more varied foliage than we are accustomed to in the High Alps; the pines—and what pines!—no longer predominate, but appear as dark cones of shadow amidst the fresh green of early summer, of beeches and alders, of copses that a few weeks earlier must have been ablaze and fragrant with blossom. Suanetia in June, in the flower-time of the rhododendrons and the azaleas, and again in October, when the azalea leaves are red and the birches golden against fresh autumn snows, must be one of the wonders of the world. The villages, as a rule, stand in open valleys or on slopes with a southern exposure, but the vegetation and flowers are most luxuriant on hill-sides facing north. The difference cannot be accounted for by varieties of soil. It may be attributable to the snow lying longer unmelted and serving to protect the ground from the hard frosts of spring.

* 'Savage Suanetia,' by C. Phillippes-Wolley, 2 vols., London, 1883.

Spaciousness, sunniness, variety are the constant qualities of Suanetian landscapes. The great basin of the Ingur, 40 miles long by 10 to 15 broad, is broken by no ridges that approach the snow-line, and the long undulating grassy or forested spurs that divide the glens, in place of narrowing the horizon, furnish in their soft lines the most effective contrast possible to the icy peaks and rigid precipices of Shkara and Tetnuld, of Ushba and the Leila. From the varied beauty of forests and flowers the eyes are carried at once to the pure glaciers, which hang like silver stairs on the green lower slopes of the snowy chain. The atmosphere has none of the harshness of that of Switzerland in summer. The breezes from the Black Sea bring up showers and moisture to soften the outlines and colour the distances; the wind from the steppe suffuses the air with an impalpable haze, through which the great peaks glimmer like golden pillars of the dawn.

I made my way in and out of Suanetia four times last summer. The panorama from the Latpari Pass (9200 feet), by which the valley is generally entered from the south, is a brilliant introduction
Scenery.

to the district. Opposite the spectator, beyond the trench of the Ingur and a range of foothills—broad green downs, unbroken by crags or wood, clothed in deep flowery grasses that fall only to the sharp scythe of October frosts*—rise the great granite precipices of the central group of the Caucasus. To the left, Tetnuld—a mountain I climbed—shoots up in a keen pyramid of spotless snow. Behind it and more distant is Gestola, the sister peak, ascended from the north by Mr. Dent and Mr. Donkin in 1886. The frozen cascade of the Adish Glacier seems to pour from under it. The ten miles of cliffs of snow and ice beyond are Djanga and Shkara. At their base lie the sources of the Ingur. My catalogue can, I fear, give but a poor idea of how noble these great peaks look, glowing in the sunshine of a cloudless summer noon. Alpine travellers may lend some distinctness to their vision by picturing the Macugnaga face of Monte Rosa, doubled in breadth, and the Weisshorn and Dent Blanche set up close beside it.†

Farther west, the eyes overlook the labyrinth of green hills and glens, of forests and pastures that is Suanetia. The twin towers of Ushba‡ indent the western horizon; the flat crest of Elbruz barely

* The peasants mow large spaces for winter fodder; but much more remains unmown and ungrazed. The great alp at the source of the Ingur I found a virgin field of flowers.

† See 'Alpine Journal,' vol. xiii., for an illustration of this and other views from my sketches. See also plates in M. Bernoville's 'Suanétie Libre.' The description of the view in the English edition of Von Thielmann's 'Travels in the Caucasus, &c.,' is defaced by inaccuracies in translation, and the author's recognition of the peaks is not in all cases to be relied on.

‡ M. Bernoville and others have thrown doubt on the meaning Storm- or Rain-peak which I gave to the word Ushba in 1869. It may be as well therefore to mention that the translation has the authority both of Dr. Radde and Captain Telfer.

shows over their north-eastern shoulder; the broad snows of Dongusorun (14,600 feet R.S.) and the shapely peak (Stabler?) between the Nakra and Neskra glens appear further to the left; when the traveller descends, the long spurs of the Leila come into view, turning, as the sun falls, their shadowy sides towards him. Far below, the waters of the Ingur flash in their deep gorge. Passing through rhododendron banks and azalea copses, that bloom in June, the path zigzags between weathered birch-stems, the branches of which frame the great horn of Tetnuld, pure white between the green earth and blue sky. What malicious sprite moved M. Reclus' pen to write that the Russian soldier finds his familiar birch only as an "arbre chétif" in the Caucasus? * The birch is the tree, above all others, characteristic of the highland scenery.†

The first time I penetrated Suanetia last year I came from the north over the great chain from Urusbieh, on the Baksan. My companion, M. de Déchy, having organised a train of Tartar porters, we crossed, on July 26th last, the Adyr Pass, only rarely used by natives of the country, and unknown to travellers. We camped where five glaciers meet at the head of the valley on the northern side. There was a shepherd's *kosh* among the birches below the ice in a position not unlike the Fée Alp. *Kosh* is Tartar for a chalet, only here there is no chalet; the shepherds are content with a little birch-bark shelter, and their *bourcas* or sheepskin cloaks. Their milk is always sour, but they make excellent Devonshire cream. The glaciers we had to climb were extensive, the pass was high—over 12,000 feet—and the ascent to it steep in places.‡ Our porters, who declined to be roped, steered their course through the concealed crevasses of the upper névé with the instinct of chamois. I inquired more than once, and was told that there was no tradition of a life having been lost in a crevasse, though accidents from avalanches were not uncommon. We ascended, for some six hours, from our bivouac at the lower end of the glaciers (7500 feet), every step over ice or snow. Then we stood on the crest of the Caucasus, and saw to the south, across an enormous glacier basin, another range as high and infinitely steeper, clad in icy armour, delicately fluted by the channels of the snow that had fallen during the recent warm, showery weather.§

* 'Géographie Universelle,' vol. vi. p. 81.

† It is only in Val Maggia, the beautiful but neglected valley at the head of Lago Maggiore, and the neighbouring glens, that the birch plays a conspicuous part in Alpine scenery, and there it is not, as in Norway and the Himalaya, one of the trees that grow nearest the snow.

‡ A pass named the Mestia Pass, and probably but not certainly the same which we crossed, is given in a table of measurements communicated to me by General Shdanov as 12,012 feet. According to our own measurements, taken with two aneroids and a mercurial barometer, the height of our pass was over 12,100 feet.

§ See illustration from photographs by M. de Déchy, taken a few hundred yards beyond and about 100 feet below the pass. Midsummer is a rainy season in the Western Caucasus, the late autumn is the finest part of the year. See the 'Meteorological Statistics of the Russian Empire' in the R.G.S. Library.

From our feet stretched, in a trough parallel to the watershed, and between us and the southern range, a glacier larger than the Glacier du Géant—a glacier no civilised man had ever seen before.

The scenery was sublime. In front, as we descended, towered the great twin brethren of Suanetia, the peaks of Ushba. Behind us, Tetrnuld raised its horn over the intervening ridges; glaciers streamed down from every side to meet the main stream. At last, where a great tributary flowed in from the west, the united streams turned south, and we left them for the green slopes. I flung myself upon the first bank of Caucasian rhododendron; its creamy flowers, often delicately stained with pink, whitened hill-sides overgrown with *Anemone narcissiflora*, ranunculus, gentians, forget-me-nots. Such colour and such luxuriance in the lap of eternal frost! Presently our porters saw, or thought they saw, a *tur*, and there was a little stalking, with no result; then we had to go down again on to the moraine-covered ice. Very bad walking we found it, and glad enough we were to return to an old moraine thickly overgrown with copse, and beautiful with larkspurs, lilies, wild rose-bushes, and many strange blossoms. Once more a ravine and the torrent from an upper ice-field drove us back on to the ice. When we left it finally, the pine forest and the snouts of our own and another glacier were in sight.* A narrow foot-track ran along the hill-side. Nowhere yet since daybreak had we seen a path or a bit of ground level enough to pitch a tent on. I ran on; presently I came on the line of an old grassy moraine 200 feet above the present ice; between it and the natural slope was a tiny dell, a stream passed close by; bushes and grass were cut for a floor, our Whympers' tents went up with their accustomed speed, and the porters fell together in a heap. In the night I heard heavy pattering, a shower was falling, our native companions had retired to the neighbouring pine forest, where the blaze of their camp-fire betrayed their refuge.

Such is a day on the glaciers of Suanetia. We had taken fifteen hours to cross them. Granted that an ordinary Alpine party crossing a known Alpine pass might have saved three or four hours, still we had been over as much ice as lies between Grindelwald and the Grimsel, or Zermatt and the Val de Lys.

I must leap over several days and much of interest to reach Betsho, the Russian post, where the hospitable Nachalnik and his very modest army of ten men are quartered. Imagine a valley like that of Breil, but ringed with gentler slopes and softer forests,

* These glaciers probably descend lower than any others in the Caucasus, terminating at about 5500 and 5700 feet respectively. They must have met not many years ago. Abich very strangely omitted to visit them when he measured the more eastern glaciers of Free Suanetia. His figures are—Zanner Glacier, 6600 feet; Adish Glacier, 7500 feet; Kalde Glacier, 7912 feet; Shkara Glacier, 7935 feet. The three latter have comparatively limited nées. The Thuber, according to M. de Déchy, terminates at 7000 feet. M. Favre visited the base of the Mestia Glaciers, but did not measure the altitude. The Suanetian glaciers are advancing after a period of retreat, like the Alpine.



USHBA.

(From a Photograph by M. DE DUCHY.)

where ash and elder, and beech and birch mingle their branches, and in the place of the Matterhorn an enormous double-headed peak, Ushba. From Betsho the mass is so foreshortened that it does not do itself full justice. But I only say this, perhaps, from an exaggerated fear of exaggeration. It is a prodigious mountain propylon. Its greater glaciers fall north and east; on this side there is only a comparatively small one.* I went up this glacier—and climbed on to the highest of the rock-needles that separate it from the basin of the Ushba Glacier. The peak was about 12,000 feet high, and a stiff climb—at least my arms and shoulders were very stiff next day. The upper névés were unfortunately in a very peculiar and dangerous condition. Wherever the slope approached 40° the whole surface began to slide away when you set foot on it, and often before. The stillness of the glacier region was broken by a low perpetual hissing as the upper layer of snow glided downwards. Consequently we had to attack the southern sunny cliffs, which were very steep, but not dangerous to practised climbers. The summit was a double-topped granite needle. We were rewarded by one of the most wonderful mountain views I have ever seen. The great towers of Ushba, so close one seemed almost able to touch them, still shot up 4000 feet overhead; as many feet below spread the torn ice-falls of the Ushba Glacier. Beyond it rose two great spires of snow—Shichildi Tau and Little Ushba. Other sports have their excitement; but can there be anything so delightful as

“to sit upon an Alp as on a throne,”

particularly a throne no one has ever sat on before, and gaze on splendours that have been waiting since the creation for some one to worship them? The Sleeping Beauty waited 100 years. How many thousands have these Caucasian virgin summits dwelt—“remote, serene, and inaccessible”—in their frosty solitude!

In descending we rode down in fifteen minutes, on little avalanches of our own starting, what had cost us two hours to climb. In better conditions of the snow, Ushba itself may probably be ascended; but it will require above all things mountaineers of sound technical judgment. It is a delightful walk or ride from the Gul Glacier down to Betsho. I left the guides and walked on alone, meeting on the way Prince Wittgenstein, a Russian officer (since deceased), who spoke English as well as I do. He was out with a native prince prospecting for gold. As every schoolboy knows, the Golden Fleece was bathed, and caught its glitter in the waters

* The illustration, from a photograph by M. de Déchy, is taken from the hill-path connecting Latal and Betsho, and shows the southern side of the peak. Gulba is on the extreme right. “La roche prédominante de l’Ushba est un Granit blanchâtre à petits cristaux de Feldspath, &c.; il est intimement lié avec d’autres variétés de Granit qui s’approchent beaucoup de Gneiss à gros grains de Quartz” (Abich). Ushba and Little Ushba are both, like Tetnuld, on short southern spurs of the main ridge or watershed. Dychtau, Koshtantau, and the peaks north of the Uruch form part of a separate parallel granitic ridge.

No. VI.—JUNE 1888.]

2 B

of the Ingur. The camp of the princes showed a very interesting survival of old habits. Four solid trunks had been fixed in the ground, and the camp followers were building in a roof and walls with lesser branches. Persian rugs and saddle-bags were lying about, and gave colour to the picture. If a thunderstorm had not been obviously imminent, I should have envied the princes their arbour. As it was, the court-house of Betsho and a hammock attached to the bar, which I fear I dislocated (not, I trust, to the inconvenience of future practitioners), seemed preferable.

Some days later I started with my Alpine guides to climb Tetnuld. This great mountain and Ushba preside over Suanetia, as the Jungfrau and Wetterhorn do over the Oberland.* Perhaps the most beautiful of all the views of it is from Mestia, where the forests of the Mujalalix frame its shining crest. Its summit is a snowy pyramid, formed, like the Weisshorn, by the convergence of three ridges.† It stands about a mile south-west of the main chain, and three great glaciers flow from its three flanks—the Tetnuld, the Zanner, and the Adish. The névés of the two latter join on the high ridge at its rear. The ends of the two former unite at the base of the western spur of the peak. Below their junction, a steep, narrow, densely forested, and almost trackless gorge gives passage to the torrent of the Mujalalix.

I was determined to attempt the ascent before I left Mjäl. My companion, M. de Déchy, was more anxious to recross the chain. We agreed that I should start with the Alpine guides a day in advance, and should endeavour to rejoin him on the second night at a bivouac somewhere on the side of the Zanner Glacier. There was one man in the village who said he had crossed the glacier to Bezingi twenty years before. Of the conformation of the snow-fields we knew absolutely nothing. All the detail of the map given herewith is subsequently and personally acquired knowledge. The upper part of the peak I had studied with field-glasses, and in one of the photographs taken by Count Levershoff's expedition in 1869, and had thus laid down a line which we exactly followed.

The two glaciers had once pushed together some way down the gorge. They had retreated quite a quarter of a mile, and now only just met. Abich gives for their termination the height of 6500 feet. Judging from a photograph taken in 1869 their end is now at least 300 feet higher. We crossed them, and climbed up the snow-beds and banks of rhododendron, which lay between the ice and the cliffs of the western spur of Tetnuld. The glacier fell beside us in a long ice-fall, overhung by the castellated ridge which looks down on the pasturages of Adish. At about 9000 feet.

* I reserve any final statements as to their heights. They cannot fall much short of 16,000 feet.

† See plates of it in my 'Central Caucasus,' in the 'Alpine Journal,' No. 98, and in Bernoville's 'Suanétie.'

we found the highest quarters properly furnished for a bivouac. A large boulder overhung sufficiently to give protection from any shower; there was grass for a bed and rhododendron stumps for a fire. With sleeping bags and rugs we suffered no hardships.

Half an hour past midnight I was awake by the moon looking over the eastern crags. In fifteen minutes we had all laced our boots, shared the contents of one of Silver's Self-cooking Soup tins, and shouldering our day's provision, left the rest of our goods to the mercy of the mountain goats. The shadows of the crags diminished as the moonlight flowed down the channels between them. Presently there was no more *terra firma*, and we had to take to the glacier. It was not easy to see the best way over the narrow ridges between the ice trenches in the white uncertain moonshine. Our first attempt failed, but at the second we gained easily the centre of the glacier. Above us the ice turned to *névé*. A vast white curtain, a mile broad, poured down before us, and high overhead, crowned with stars of astounding brilliancy, for the moon was passing westward, glimmered the pure white virgin peak of Tetnuld.

The ascent among the *séracs*, or broken masses of *névé*, was very long. But it did not seem so to me. The actual pathfinding was sufficiently difficult to be amusing, the situation was stirring. The scenery was more fantastically lovely than a child's dream after a pantomime. Huge towers of milk-white snow shone against the dark blue heaven—blue is not here a conventional epithet; green icicle-hung vaults yawned between them. The planets were something more than mere points of light, they were glowing balls. Slowly they faded, and a light played in the sky behind Tetnuld; arrows of daylight flew round the edge of the world high in the air above us; other arrows seemed to rise to meet them from the sea. It was very long before the light touched earth. But at last the great dome of Elbrus, the snowy heads of Ushba, flashed out, first red, then golden, above all the lower heights. In a few minutes the frosty Caucasus was flooded with golden light; the shadows crept away under the loftiest peaks. Only the Black Sea basin lay still sombre in the western hollow beyond the grey crests of Abkhasia.

The clefts and caverns in the snow had grown frequent and troublesome, the bridges over them frail and awkward, and for a few minutes our progress seemed barred. In this kind of snow-work the boldest course is often the best. Strike at the slope where it is steepest, and the chasms have been choked by pieces fallen out of their own sides. We did so, and were rewarded. Shouldering our way up among some huge tumble-down ice-pits, we gained a wide snow-plain lying under Tetnuld.

Our next stage after crossing the level was to ascend another long crevassed slope to a broad terrace under the cliffs of the peak, which rose towards its southern end until it nearly touched the ridge that falls in the direction of Adish.

It took us eight hours to reach that ridge from our bivouac, for the snow was soft. There was one steep bank of ice intersected with crevasses and masked with snow which would have stopped raw climbers; but difficulties, in the strictest Alpine sense of the term, there were none. It was rather cold in the shadow, and, strange to say, one of the Chamonix men was badly frostbitten in the foot without knowing it at the time. At 9 a.m. we heaved our leader over the last crevasse—the “Bergschrund”—and he tugged us up a short bank, on the top of which we sat down in the warm glorious sunshine. We were on the southern spur of the peak, on a little saddle very conspicuous from the Latpari Pass.

This was the decisive moment of the day. I looked up the long, lovely snow-ridge which curved down to us from the still far distant summit. It was broad enough, and no ice glittered on its crest. “That will do,” we all agreed. And then we feasted our eyes on the view. For the first time the sources of the Adish Glacier, hemmed in between Djanga and Tetnuld, were revealed to human eyes—a shining tableland never before looked down on save by the heavenly host. We gazed along the face of the great precipices and icefalls seen opposite from the Latpari Pass. At our feet—very much indeed at our feet—lay Adish.

The rest of the climb was only a question of a good head and perseverance. The Edge (as a lakesman might have called it) fulfilled its promise; the snow gave firm hold, but was too soft for speed. Our leader had consequently to be frequently changed. Now and then steps were cut; once we were forced on to the flat top of a snow cornice—a cornice, however, which we had carefully observed from below, and which would have borne an elephant. All the way the views were sublime. The sensation of looking down by itself was almost more than enough! Those who know the downlook from the top of the Wetterhorn will understand what I mean when I say that all the way up the final ridge of Tetnuld you enjoy the same sensation. The snow drops steeply for a few yards, and then, between your boots, you see the sledge-path of the Jkumer Pass, 7000 feet below. In the west Elbruz loomed larger and larger at every step, till all the minor heights sank to footstools before the great white throne. So three hours and a half passed; the aneroid turned 16,500, and still in front rose the sharp-cut sugarloaf. At last the peak got a little steeper and narrower; the converging ridges were no more seen; there seemed little but air about us. Twenty minutes later, soon after 1 p.m. the crest ceased to rise; our heads overlooked it, our feet trampled it—and another great peak of the Caucasus was climbed.

Illimitable shining fields of space, waves upon waves of distance clothed in tints that grew softer and more aerial as they curved to the enormously remote horizon, to the north the level lines of the steppe, to the south tossed Armenian and Turkish highlands, east and west snowy bays and silver pinnacles, glaciers descending in broken shining stairs

to the green valleys and river sources, a silence that might be felt; such were the impressions of the first few moments on this noble virgin peak.*

I am afraid I enjoyed the next hour more than a Secretary of this Society ought to have done. I might have been boiling thermometers, and making all sorts of observations. But I would put in a plea for the makers of first ascents. May they not enjoy the poetry of the mountain tops? They have opened the way, it is easy for others to follow them. Mountaineers are not the camp-followers—as some pressman impertinently remarked the other day—but the pioneers of science. “*Fiat experimentum in corpore vili*”: I admit to the full the proverb. Where the vile body of the mountaineer has opened the way, the worthy army of surveyors can follow at their leisure. If I had tried to measure precisely, I might not have been believed, and I should only have given more skilful successors the satisfaction of showing how far I was wrong. General Shdanov, of the Caucasian Survey, sends me a height, 15,947 feet, as trigonometrically ascertained for a peak, which must be either Tetnuld or Gestola; and of these peaks Tetnuld is the higher by from 100 to 200 feet. I do not believe 16,000 feet will be far wrong as an approximate estimate for the height of Tetnuld. My aneroid actually gave 16,700 feet, but from other observations and comparisons taken next day I have good reason to estimate its error at the time and place at over 500 feet. Mr. Dent’s aneroid, on Gestola, gave 16,550 feet. Tetnuld is certainly higher than Mont Blanc, and one of the great peaks of the Caucasus.

We saw many interesting details from our space-searching summit. The broad snow-fields of the Zanner, over which next day we must force a way, the great peaks of Koshtantau, 17,092 feet, and Dychtau, 16,925 feet, and Shkara, possibly higher than either, a northern valley (Chegem), and the distant steppe, the sunny lowlands of Mingrelia, a floor of sea-haze, remote ranges beyond Kars and Trebizond. Ararat itself I tried hard to find. General Chodzko, the late head of the Caucasian staff, is positive that he saw Elbruz when encamped on the top of Ararat, at a distance of 280 miles; and General Chodzko is likely to have been right.

The most beautiful moment in the descent was when a procession of sea-born vapours, which came up like the ocean nymphs in the ‘Prometheus Vincit,’ passed lightly round us, melting away into the sky before sunset. We regained our rhododendron bank and boulder at 7 p.m., and had again every reason to be satisfied with our accommodation. But no sign of our companions could be seen on the opposite glacier, nor did the expected beacon fire answer our own.

* I have, I find, unwittingly plagiarised. Conrad Gesner, one of the great naturalists of the Renaissance, and the first modern mountaineer, wrote in A.D. 1555, in his ‘*Descriptio Montis Fracti*’ (an ascent of Pilatus):—“*Oblectabit ipsum denique solitudinis silentium. . . . Hic in profundo et religioso quodam silentio ex præaltis montium jugis ipsam ferè cælestium, si quæ est, orbium harmoniam exaudire tibi videberis.*”

At 5 a.m. next morning we started in pursuit; two hours later we found their camp; three hours more and we caught up the motley troop on the upper basin of the Zanner Glacier. The Suanetians had most of them blacked their faces in order to avoid sore eyes and sunburn, which gave them a most repulsive appearance. Our progress was now slow, for the men were overburdened. About noon we reached a vast expanse of undulating snow-field. Light clouds drifted over. The snow got terribly soft. Our men walked for five, and sat down for ten minutes. The sun was falling. I went to the front and tried to force the pace. Suddenly I felt myself alone, my companions were hidden by the mist. I retraced my steps, and found the motley troop squatting on their haunches and praying at the top of their voices. They seemed to have a form of common prayer suitable for the occasion. I did all I could to cut short the ceremony, but they were imperturbable. At last the mist lightened, a rift of blue opened, the rocky ridges stood out. The groans changed to a chant of exultation, a triumphant welcome to the reappearing deity.

It was 6 p.m.—that is, we had been out thirteen hours on the ice and snowfields—before we stood on the crest of the Caucasus at a height of over 13,000 feet, and looked down on the great basin of the Bezingi Glacier and the mighty peaks that encircle it. The scene that burst on my view as I made the last step on to the frozen and overhanging wave that formed the Col was of overpowering grandeur. There is nothing in the Alps to compare to the gigantic line of peaks and precipices which rose before me. Mr. Donkin's photographs give but an imperfect idea of the mountain proportions. We looked up a long glacier avenue, with the northern front of Shkara to our right, and Koshtantau, a great rock-peak, opposite. No green valley was visible, there was nothing but this vast amphitheatre of ice and snow; the only glimpse beyond was into the equally wild head of the Dychnu Glacier. Evening shadows were already lengthening from the peaks, and warning us to seek some less uninhabitable spot before nightfall.

The further side of the pass was barred by a cornice and a snow-wall fifty feet high, with a moat at the foot of it. To get down directly would have been difficult. But a few hundred paces to the left it was possible, and even easy, for any one accustomed to snow-climbing, to descend by the aid of a rib of rocks. Our Suanetians were all making a great hubbub, alternately peering over the wall, and either praying or swearing, it was difficult to say which. We thought it best to set an example by starting ourselves. In less than ten minutes we were over the Bergschrund, and on the comparatively level glacier below. But our troop still declined to follow. They jabbered, they screamed, they gesticulated, they did everything but what we wanted them to do—come on. At last three of the men tied themselves together with the Kabardan Cossack, who by the courtesy of the Russian authorities had been

placed at our disposal, and set out. They got on pretty fairly at first, then they lost their heads and their footing, and completed the descent in a series of flying bounds, in one of which they fortunately cleared the crevasse. The rest followed with ridiculous precautions. The whole affair cost us an hour of precious daylight. It was dusk before we were off the little glacier. By good luck the hillside below it consisted not of granitic cliffs or boulders, but of slopes of soft pulverised schist. We ran or rather slid down them, until we found the first level on which to set up our tents (11,000 feet) high above the great Bezingi Glacier. Our Suanetians were soon themselves again; they chanted a ballad in honour of their eleventh century queen; "Thamara, Thamara," rang the refrain. Fanny Sussex labourers singing of Harold and Senlac! But within these mountain walls the historical echoes that are lost in wider plains and world-trafficking islands, roll on from generation to generation.

Helpless you see these mountain people had proved at the first shadow of what Alpine climbers call difficulty. And helpless Caucasians and Himalayans will as a rule be found by future glacier explorers, except on passes where they are accustomed to go themselves. For ice-craft in distant countries, travellers must depend on what they import, or have in themselves. The Urusbieh Tartars are promising raw material. A leader of men may make something of them: but sandals stuffed with hay are poor things on an ice-slope! Of course the natives' limit of the possible is what they can do themselves, and all but the best-informed Russians readily adopt it. No ascent made without them will be credited in the country. There are people in other parts of the world foolish enough to make the opinion of such simple folk their own. Their borrowed simplicity furnishes an inexhaustible source of amusement to those who know better.

But here, high above the noblest Caucasian ice-fields, I must cut short my climbing reminiscences and reflections,* and reserve for the autumn the heavier portion of my paper. This sketch of Caucasian travel will serve its purpose if it incite some competent mountaineers to carry on in the next and future summers the work of mountain exploration, and so to add to our knowledge of the high places of the world. Our globe must be explored, as the German professor puts it, vertically as well as laterally. The mountain heights as well as the ocean depths must yield up their secrets. If we are to make geography—the picture of the earth—complete, we can no more do without mountaineers than we can do without sailors. The art of mountaineering, which has been developed in the Alps out of the rude instincts of the crystal-seekers of Savoy and the chamois-hunters of Canton Bern, must

* A more detailed account of the expedition here referred to, and of some subsequent explorations, will be found in the 'Alpine Journal,' Nos. 100 and 101 (May and August, 1888).

be kept up and put to use elsewhere. It must above all be introduced into Asia. The border chain of the Caucasus will serve as a good training-ground for the Himalaya and the Tien-shan, where English and Russian mountain explorers may some day meet in friendly rivalry. Meantime it is a great pleasure to me to be able to state that there is every prospect that the friendly co-operation between mountaineers and surveyors which has borne so much good fruit in the Alps will continue in the Caucasus. I am under great obligations to the present Director of the Caucasian Survey for the valuable material he has placed at my disposal, and his promise that in every way consistent with their duties his subordinates shall co-operate in extending our scientific knowledge of the mountains holds out a promise of speedy and valuable results which would otherwise be hardly attainable for many years.

NOTE.—The accompanying sketch map of the central group of the Caucasus is a small portion and a specimen of the map of the chain from Kazbek to Elbruz, which I hope before long to be in a position to publish. The positions of Shkara, Dychtau, and Koshtantau, and (with some exceptions in the upper glens) the topography *below* the glacier region, are borrowed from the 5-verst Russian survey. For the basin of the Bezingi Glacier Mr. Donkin's map ('Alp. Journ.,' vol. xiii.) has been mainly followed. The rest of the chain is laid down from photographs by M. de Déchy and from sketches, observations, and bearings taken by myself from points on all sides of the group, as well as from the summits of Tetnuld and Uku. The map, without pretending in any sense to the accuracy of a professional survey, will, it is believed, be found the first approximately correct representation of this intricate cluster of peaks and glaciers, the details and connection of which, so far as they are indicated at all, are most erroneously indicated on all previous maps, including those appended to Dr. Radde's and M. Bernoville's volumes. Many details in the valleys shown by the official survey have been purposely omitted. The heights are from the Russian survey, from communications kindly made to me by General Shdanov, the present head of the Staff at Tiflis, and a few from the observations of M. de Déchy, Herr Abich, myself, and others. The Suanetian heights in Captain Telfer's work, I may here mention, are throughout some 700 feet in excess.

The nomenclature of the great peaks in every chain is always a difficult problem to the first travellers and cartographers. I have adopted the names used by the Russian Staff in the 5-verst map, with three additions: Uku, Mala Tau, Mishirgi Tau. Uku, M. de Déchy assured me was the name given to the second summit I climbed, or at any rate to the portion of the range comprising it, by the people of Bezingi, from whose homes the peak is visible. Mala Tau and Mishirgi

Tau are names I venture to propose in accordance with the principle, or, let us say, common practice, by which glaciers are named after the valleys or pastures they flow towards, and peaks from the glaciers they dominate. Familiar instances in the Alps of this practice are the Matterhorn and Piz Palu in the Bernina group.

With regard to the 5-verst-map nomenclature, although I think that having been in use for more than twenty years it would be very inconvenient to attempt to alter it, there can be little doubt that the peaks designated as Dychtau and Koshtantau are not distinguished by the people of the country under these names. Tau—like Tauern in Tyrol—is applied more often to a range than to any individual top. Dychtau is the name given in Balkar to the part of the chain round the glacier that feeds the Dych-su torrent, and is rather applied to Shkara than to the Dychtau of the map. Shkara is the name of a pasture above Ushkul, so is Nuamquam. Tetnuld is the *massif* south of the Zanner glacier with its crowning peak.

As a general rule, single mountain peaks, unless they are conspicuous from the lowlands, or exceptionally isolated, do not receive separate names until they are “discovered” by educated travellers. The Bernese Oberland stands pre-eminent and almost alone in the noble and poetical names of its icy crests. Elsewhere mountains, when they have names at all, generally derive them from some obvious characteristic, or some homely resemblance. In the Pennine Alps, the peasants ring the changes between Dent Blanche, and Weisshorn, and Rothhorn, or in the Mischabel and the Silberlast (the old name of the Lyskamm) suggest that the shapes of the summits remind them of a farmyard fork (Mischgabel), or a pack-saddle. Again, the literary and permanent names of many summits are miscopyings by strangers—travellers or surveyors—of local language. Thus, the Aiguille Verte and the Montanvert are the Aiguille and Mont-en-vers—at the back. The Pointe de Rosablanche and the famous Monte Rosa on either side of the Val d'Aosta represent the native names Roesa-bianca and Monts Roeses; Roesa, or Roese, or Ruize (cf. Ruitor), in local dialect meaning ice- or snow-field.

But I must not allow myself to be led into a treatise on mountain nomenclature. My individual feeling, or prejudice, is strong in favour of, wherever possible, obtaining or giving a name in the language of the country, and of in no case superseding a native name. In cases, however, where no native name exists, or can suitably be adopted, I should agree that a peak may fairly be named in commemoration of any individual to whom from his connection with the exploration or mapping of the range such an honour would be obviously appropriate.

[At the conclusion of the paper, Mr. FRESHFIELD exhibited, by means of the dioptric lantern, a series of sixty photographic views, of which about two-thirds were taken by his companion, M. de Déchy, of the high

peaks, passes, glaciers, villages, and people of the Central Caucasus. These views represent only a small portion of M. de Déchy's collection. The views of the peaks round the Bezingi Glacier and of the Tartars of that valley were taken in 1886 by Mr. W. F. Donkin.]

Mr. J. BRYCE, M.P., said that he had crossed the Caucasus by the Dariel Pass, and in Trans-Caucasia he took the opportunity of making inquiries about the antiquities, history, geology, and botany of the country; but most of what he learned was at second hand, and therefore not as valuable as the information supplied by Mr. Freshfield. The lowlands to the south of the Caucasus were no less than the valleys of the chain of the highest possible interest. They were the seat of many races, languages, religions, habits, customs, and fragments of civilisation which had never ripened; and in all probability, in some future time, when the East was awakened from its torpor, those countries with their great natural resources would become a route for traffic from the Black Sea into Central Asia, and again be the homes of flourishing populations, and perhaps powerful kingdoms. Every mountain range had a character of its own, and a sentiment of its own, and the Caucasus awakened quite different emotions from the Alps. Even in Europe the snow-capped Pyrenees and the superb peaks of the Tatra were wholly unlike the Alps; and in America, a traveller who visited the Rocky Mountains, or the magnificent extinct volcanoes of the Cascade Range on the shores of the Pacific, was still more struck by their total dissimilarity from the scenery of our greatest European mountain-land. For instance, in the Alps there were 3000 or 4000 feet of pasture between the higher woods and the region of perpetual snow, but on the shores of the Pacific there was only an interval of about 1500 feet between the enormous forests and the snow mountains themselves. It was an extraordinary thing that the Suanetians, who, by the last census, were 12,000, should have preserved their separate national identity from the time of the Emperor Augustus to the present. From what he was told at Tiflis he was under the impression that the Suanetians considered themselves still Christians. They fasted, and made the sign of the cross; but Christian doctrine had practically disappeared from among them. Mr. Freshfield had referred to their praying, and he wished to know what they prayed to.

Mr. FRESHFIELD said, that as far as he could gather through a Cossack interpreter, their prayer was addressed to the sun, and according to M. Bernoville, who gives as his authority a Georgian priest, they worship the sun and moon.

Mr. BRYCE said that was a remarkable and almost unique fact. There were a certain number of races that were formerly Christian but had become Mahomedans; but that a people who had reached the level of Christian monotheism should fall back into heathenism, was almost without a parallel in history. He hoped that other English explorers would follow Mr. Freshfield's example, and not leave the honour of discovery entirely to the archæologists of Russia.

Mr. C. T. DENT considered that Mr. Freshfield had done a great deal towards clearing up the topography of the glaciers, doing in one season almost as much as had been done by others between 1868 and 1887. The five-verst map, while wonderfully accurate generally, was very misleading above the snow-line, the glaciers and high glens having been put in almost at hap-hazard. He hoped that there would be some uniformity in the nomenclature of the peaks. It was impossible accurately to map the glacier regions without a certain amount of mountaineering craft, and without utilising that store of knowledge which the Alpine Club had amassed. A mapping party in such high districts should contain several mountaineers.

The PRESIDENT, in proposing a vote of thanks to Mr. Freshfield, said that he

desired on behalf of the Society to acknowledge that it was through the courtesy and by the friendly intervention of His Excellency the Russian Ambassador that facilities had been afforded to Mr. Freshfield to pursue his investigations. It must be a matter of considerable interest to Englishmen that they had within easy reach these magnificent mountains—great glaciers, extremely difficult peaks to climb, magnificent forests, beautiful alpine vegetation, and many very interesting peoples. Mr. Freshfield's observation as to the comparatively recent recognition of the existence of true glaciers on these mountains, led him (the President) to remark that a similar doubt had long prevailed as to the presence of glaciers in the Himalayas—a doubt which he had assisted in removing some thirty-five years ago. As a matter of fact, many of those glaciers, including those in Tibet, were two or three times as large as any known in other parts of the world, excluding, of course, the Arctic and Antarctic regions.

Exploration of the Solomon Islands.

By C. M. WOODFORD.

(Read at the Evening Meeting, March 26th, 1888.)

Map, p. 404.

In October 1885 I left England with the object of paying a visit to the group of islands known as the "Solomon Islands," for the purpose of making collections of the fauna, and, if possible, penetrating to the mountains of the interior of some of the larger islands, which had not yet been visited by white men.

The Solomon Islands are a group lying about 500 miles to the eastward of New Guinea. They extend for 600 miles in a north-west and south-east direction, and are situated between the parallels of 5° and 11° S. lat., and the meridians of 154° and 163° E. long. They were first discovered by Mendana, the Spaniard, in 1567, who gave them the name of the Islands of Solomon, in order that his countrymen, supposing them to be the islands whence King Solomon got his gold, might be induced to colonise them.* There are seven principal islands and

* Identity of Island of Jesus.—In the notes to the very interesting translation made by Dr. Guppy of the Journal of the Spanish discovery in his book 'The Solomon Islands and their Natives,' he suggests that the "Island of Jesus" (an island discovered by the Spanish some days before they sighted the Solomons) may be yet re-discovered in or near the position assigned to it. But with our present knowledge of that part of the Pacific I think it hardly possible for an unknown island to exist in that position. There appears to me little doubt but that Gallego's Island of Jesus was one of the more northern islands of the Ellice group. Three or four of these islands are within the limit of the usual error of Gallego's latitude, which he computes for the Island of Jesus at 6½° S. The Island of Jesus was described by Gallego as a low island, and with many reefs around it, and with quite a bay of the sea in the middle. Evidently this refers to an island of coral formation with lagoon, such as the Ellice Islands are. He estimates the distance of the Island of Jesus from Callao at 1450 leagues, and from the Island of Jesus to Candelaria 165 leagues. But Gallego was considerably out in his reckoning—the distance from Candelaria to Callao being in reality about 7200 miles, whereas he makes it only 5600. He was, of course, unaware of the very strong current running

numerous smaller ones. The total land area of the group I estimate at 15,000 square miles, or considerably more than twice as large as Wales. With their geological features I will not dare to deal, as they are ably treated of by my friend Dr. Guppy in his recently published book 'The Solomon Islands: their Geology, General Features, and suitability for Colonisation.' I may, however, mention that they present evidences of recent volcanic activity. The island of Savo was an active volcano at the time the Spaniards discovered the group in 1567; at the present time there is an active volcano near the centre of the island of Bougainville, hot springs and sulphur are found at Savo, Simbo, and Vella Lavella, while Kulambangara is an extinct volcano. During my residence of six weeks at Alu I experienced frequent shocks of earthquake, but of no great violence. The mountains of Bougainville rise to a height of 10,000 feet, and those of the other large islands to from 3000 to 5000 feet, except on Guadalcanar, where they reach an elevation of 8000 feet.

constantly to the westward, and which would affect him more and more as he got farther west, and especially in the neighbourhood of the Ellice group. So that, although the discrepancy between the estimated distance of the Island of Jesus from Candelaria (supposing the former to be one of the Ellice group) is greater in proportion than the discrepancy for the whole voyage, I think this may be explained by his not encountering the full force of the current at first. Gallego estimates the distance of the Island of Jesus from Candelaria at 165 leagues (nearly 600 miles), the actual distance from Candelaria to the Ellice group being 1200. But as they were fifteen days going from one to the other, it would only require a drift of 40 miles a day to make up the other 600 miles, and I believe the current to be quite as strong or even more so than that. From actual experience I can say that it is utterly impossible with a south-east breeze to beat against it. And when I was in the Gilbert group, and wished to go from the Island of Kuria to Apamama, which is only 15 miles distant to the eastward, both islands being situated about 30' S., we had to go north of the line almost to 5° N. to get into the eastward current, and were nine days over the voyage.

The Ellice islanders are a brown race such as Gallego describes, and moreover they make most excellent mats from the leaf of the Pandanus, similar to those displayed by the islanders of Jesus. The fact of their lighting signal fires at night is also significant, as when I was in the Ellice group at the Island of Nukufetau, I was told that when they wanted to communicate with the Island of Oaitupu, they were in the habit of making signal fires on the reef for two or three moonless nights in succession, until they saw the glare in the sky from the answering fires made by the natives of Oaitupu. As soon as the fires were noticed on Oaitupu the Nukufetau canoes used to start early the next morning, and the fires were continued every night on Oaitupu till the canoes arrived, the distance being about 35 miles. As to the suggestion that the Island of Jesus may be Motuiti or Kennedy Island, I do not think the idea tenable. The error in latitude is too great, while I think it almost certain that the island marked in that position does not exist. As to there being another island between the sixth and seventh parallels and near 171° 30' or 172° 30' of east longitude, I think the idea quite untenable.

There is no doubt, in my opinion, that the Candelaria reefs are Ongtong Java, as Gallego speaks of *islands*, and I am told that the Roncador (or Candelaria Reef of the chart) is nothing but a circular reef awash at high tide with one rock about 12 feet high on the western side. I have talked with the captain of a schooner who once got so close to it in the night that in wearing ship he left his patent log on the reef.

As will appear later on, I made three attempts to reach the interior of this island, but was prevented by the hostility of the mountain tribes and timidity of my guides. The highest point to which I attained on Guadalcanar was 1140 feet, and at that point the formation was a kind of soapy sandstone, reminding me forcibly of the well-known Suva soapstone from Fiji, which, I believe, is described by geologists as silicate of alumina. Tin and copper have been found in small quantities on the island of San Christoval, while I myself discovered copper on the island of Guadalcanar, and from the north-west end of the island of Malayta I obtained a mineral from the natives which proves to be iron pyrites. The natives told me they used it for staining their teeth. The coast natives buy it from the bushmen in bamboos, at the fair that takes place on the coast every two or three days.

The islands are for the most part clothed from the coast to the mountain tops with the densest tropical forest, in which the immense ficus trees, of several species, are often conspicuous objects: their trunks covered with creepers and ferns, the undergrowth consisting of small palms of many species, among which and over the trees the immensely long rattans or climbing canes twine in and out in inextricable confusion. On the sea beaches one meets with the *dilo* (*Calophyllum inophyllum*), the *Barringtonia speciosa*, and a species of Casuarina, and other littoral trees that are generally met with throughout the Pacific.

In the neighbourhood of native villages, the beach will be found fringed with coco-nut palms, but my observation tends to prove that the coco-nut rarely grows unless planted. I know, however, that this is opposed to the opinions of some. In Guadalcanar, there is on the north-west coast some open, grassy, hilly country, with belts of timber in the valleys, which might probably be suitable for cattle.

The prevailing winds are the south-east trade, which blows from about May to October, and the north-west monsoon from November to April. The temperature on the coast rarely rises to 90° in the shade, but on the other hand I cannot find among my notes a night temperature below 75°. During my stay at Alu in 1886, the rainfall for the month of July (the dry season) was 8.02 inches. I regret to say that during my six months' residence on Guadalcanar in 1887 I was unable to observe the rainfall, as my rain gauge had met with an accident. However, records kept by the traders at Ugi and Santa Anna show that the annual rainfall may be set down at from 100 to 150 inches per annum.

There are seven or eight white traders constantly resident in the group, and trading schooners from Sydney occasionally call. The produce is chiefly the dried kernel of the coco-nut, commercially known as copra, which is shipped to Europe for the production of coco-nut oil. I estimate the annual export of this article to be about 1500 tons. Next in importance is the nut of the sago palm, which is used for making "vegetable ivory"

buttons, and other small articles ; of this probably 800 tons annually are now exported. Other exports are a little inferior *bêche-de-mer*, a few tons of inferior pearl shell, and a small quantity of turtle shell. The chief article of exchange between the natives and traders is tobacco, of which the natives are very fond and are pretty good judges, while pipes, wax matches, calico, beads, necklaces, Jew's harps, knives, and axes are also bought. Muskets and gunpowder, and Snider rifles and ammunition used formerly to be sold in numbers, but the supply of these by English traders is now stopped. The trade is almost entirely in the hands of Sydney houses ; occasionally, however, a trader, either actually or nominally under the American or German flag, visits the group, and not being bound by the British regulations respecting the supply of fire-arms, reaps a rich harvest.

I will now proceed to describe my visits to the various islands. There were two means of access to the group open to me—the first, from Sydney by one of the small trading schooners, and the second, from Fiji in one of the schooners engaged in recruiting boys from the islands to work upon the plantations in Fiji and in returning them to their homes at the completion of their term of service, the traffic being well known as the “South Sea Island Labour Trade.”

Of the two, the former was the more direct, but I chose the latter, as offering greater facilities for observation and on account of the greater number of places visited *en route* to the islands.

I arrived in Fiji on 17th February, 1886, and, armed with letters of recommendation from this Society and from the Natural History Museum to Sir John Bates Thurston, the Governor, I was immediately promised a passage in the first labour ship leaving for the islands. No ship was leaving at the moment bound for the Solomons, and I was delayed in Fiji for two months.

I left at length, on the 15th April, in the *Christine*, a small schooner, which was taking 120 natives to their homes in the New Hebrides, Solomon Islands, and Lord Howe's group, and had besides a license to recruit forty-six fresh natives for service in Fiji. Besides captain and crew, nine old and experienced boys, natives of the New Hebrides, were taken as crews for the two recruiting boats. We also carried a Government agent, who had entire charge of the natives, and whose duty it was to regulate the recruiting and to see that the natives were returned to their proper islands and villages.

At noon on the 20th April, the fourth day after leaving Suva, we sighted the high volcanic cone (5000 feet) of Lopevi, in the New Hebrides. Passing that evening between the islands of Ambrym and Pentecost, we turned northward and coasted along the western side of the latter island. The island of Ambrym is an active volcano, 3500 feet high, and at night the lurid glare from its summit illumines the heavens, and is visible nearly a hundred miles away.

We remained in the Hebrides from 20th April to the 6th May, during which time we visited the islands of Maiwo, Pentecost, Ambrym, Mallicollo, and Santo. Port Sandwich, on Mallicollo, is a good and commodious harbour, and completely land-locked. It has since my visit become famous as one of the places where French troops were landed. At that time there were no buildings on shore, but a store was in course of erection. It appears to me to be a very unhealthy place, as there is much mangrove, and I should say fever would be very prevalent.

In recruiting the custom is, generally speaking, as follows: When ships are seen by the natives off their coast they make a smoke ashore if they want to communicate. The two boats were then lowered, fully armed in case of accidents, with four rowers in each, one in charge of the recruiter and the other in charge of the Government agent. The former backed in on to the beach, throwing a small anchor out of the bows, so as to be able to pull off in case of attack; the crew at the same time sit ready at the oars. The recruiter stands up in the stern of the boat, while the natives crowd round him, and he conducts the trading for yams or other food or tries to persuade boys to engage. The other boat, with the Government agent, keeps afloat, and acts as a covering boat to the other in case of attack. In some instances we only used one boat, and then the recruiter and Government agent went together; but wherever the natives were mistrusted we always made use of two boats. I eagerly seized every opportunity of going with the boats, and whenever I had the chance I went ashore. I was able to do a little collecting at the various places touched at while the boats were engaged in buying food, but I did not attempt to land when they were trying to induce boys to engage, while at some places it would have been unsafe.

On Santo we met, at a desolate part of the coast, with a bush tribe, who had come down to the sea to get salt water. They were ignorant of the use of tobacco, went entirely naked, and were quite the most primitive natives I ever remember to have met. We induced four of them to come off to the ship, leaving the covering boat and its crew ashore as hostages. They were quite puzzled when we gave them biscuits.

On the 6th May we finally shaped our course for Santa Anna, in the Solomons, having landed twenty-four natives in the New Hebrides and obtained only one recruit.

On Monday, May 11th, we were becalmed off the island of Santa Anna, the most eastern point of the Solomon group, and late in the afternoon, as there was no chance of making the island in the ship, the recruiting boat was launched, taking seven natives and a child who were to be landed at this island, the recruiter, Government agent and myself going in the boat. It was dark before we pulled round the island to the landing-place, and as soon as our arrival was known the whole popula-

tion rushed down to the beach and crowded round and into the boat, which must have sunk if she had not been aground. If I had not been thoroughly assured of the perfect friendliness of these people it would have been rather startling. Eventually the boys and their boxes and then ourselves were dragged or carried ashore, and we then went to the house of a trader living on the island. We spent the night here, and the next morning at daylight I took my first walk in this interesting archipelago. Even in the short time that I was ashore I saw enough to convince me that the fauna, at least with regard to the insects, was of a much more varied and richer character than I had previously met with in the Hebrides. I saw some fine specimens of native canoes, one 45 feet long, and very elaborately ornamented. In the canoe-houses were suspended strings of pig-skulls, fishes' skeletons, spears and carved bowls, and some large wooden figures of sharks elaborately ornamented.

Next day, May 13, we landed four boys at Kahua, on the coast of San Christoval, and in the afternoon passed a village named Sarakne, where a white man named Adams was recently murdered by the natives.

On the 14th we arrived and anchored at the island of Ugi, and in the afternoon I went ashore. A white trader lives here, and it is a depôt where coals are occasionally landed for Her Majesty's ships. We spent the next two days off the coast of Ulawa buying yams. The natives were friendly, and while the boats were engaged in yam-buying I spent some pleasant hours collecting in the bush. At the north end of the island we got one recruit. He had not been away before, but could speak Fijian.

On Monday, 17th May, we arrived off the town of Saa, at the south-east end of Malayta, where we met the *Southern Cross*, a vessel belonging to the Melanesian Mission. On the afternoon of the 18th we anchored at the small island of Iyoh, on the coast of Malayta, and were at anchor here for two days, most of which time I spent on the island, there being very few natives. Leaving Iyoh we anchored on the afternoon of the 20th at a harbour known as Uru Bay, and remained there till the 25th. It was at this place that the *Borealis*, labour schooner, was taken by the natives in October 1880, while about six miles from here the *Janet Stuart* was attacked two years ago. The two recruiting boats were landing returns and endeavouring to get recruits, but it was not considered safe for us to land. However, the captain was kind enough to launch the dinghey for me, and I visited some of the small mangrove islands dotted about the bay, and shot a few pigeons. On the 21st the recruiting boats were informed by the natives that the ship we saw at Iyoh two days before had been attacked by the natives at a place called Mole, about six miles from our anchorage, and that five white men and several natives had been killed.

This part of Malayta has a very bad name, and several ships have been attacked here, the method almost invariably followed being the

same. Fifty or sixty natives will come off in canoes and engage in a body. After they are on board their tomahawks will be quietly passed up to them from the canoes alongside, as natives are never allowed to bring their arms openly on board a ship, and at a given signal they will attack all the white men from behind, when the ship is at once at their mercy. Such attacks are not made upon ships where a good lookout is kept.

The news of this attack had a most depressing effect upon the boys we had on board. I have always noticed that natives when in a strange place are always suspicious and frightened, but I never noticed it to such an extent as on the present occasion. On the 22nd the boats got four recruits from a place called Qui. They were well-grown, healthy boys of from fifteen to nineteen. The recruiter told me there was a large crowd on the beach, with whom they talked, trying to persuade the boys to engage, but unsuccessfully, and that the boats left, and the natives also left the beach. The four boys were then seen running from their friends towards the boats, and the biggest boy struck one of his pursuers. The boys were bundled by the recruiter into his boat, he and the boys getting their feet much pricked with spines of *Echinus*. When the boys were once in the boat the natives made no effort to retake them, but accepted the usual present of trade that is made as payment on such occasions. Another boy was anxious to come, but was held back by two of the natives.

On the 25th we left for North-west Bay, where we anchored at noon on the 26th, and remained until the 2nd June, during which time we landed several boys and obtained five or six recruits. We were anchored within 200 yards of the shore, opposite a shingle beach fringed with a dense tropical vegetation, among which the fragrant white flowers of the *Cerbera odollum* were conspicuous. Upon these flowers I first captured the great Ornithoptera (or bird-winged butterfly), the *O. Victorix*, peculiar to this part of the Solomon group and to the island of Guadalcanar. The male, distinguished for the brilliant metallic green and gold colour of its wings, had never previously been discovered, although the much larger though more sombre-coloured female has been known for many years, from a single specimen captured during the visit to this group of H.M.S. *Herald* in 1854. Here, with a butterfly-net in one hand and a revolver in the other in case of accidents, I captured eight females and two males during our stay.

After landing boys along the north end of Malayta, we stood over to the island of Guadalcanar, and anchored at the town of Aola on 6th June. There is a small island about half a mile from the mainland, where there is a white trader. We remained here for five days and then left, passing round the south-east end of the island and along the south coast as far as Wanderer's Bay. Leaving the latter anchorage, we shaped a course for Treasury Island.

On the 23rd we arrived at Alu, where I was to be put ashore. I landed with the captain to see Gorei, the king of this and the neighbouring islands, to whom I had been recommended. After some trouble, a man undertook to show us where he was to be found, which was on another island about three miles away. We went there in the boat, but found the natives all armed and suspicious, nor would they even direct us to Gorei's house. They told us, however, that Gorei had left to go on board our ship, but had gone the other side of an island, so we had missed him. Things did not look very promising, but there was nothing to be done but to return to the ship, and there sure enough we found Gorei, dressed in a red flannel shirt and pair of trousers, and an old sun helmet on his head. After explaining to him my wish to stay some months at his place, he expressed his willingness to assist me. He explained the conduct of his people as being caused by fear of him, and said they mistook us for the ship of a trader to whom he owed some produce. In the afternoon I landed at Alu, and he assigned me a house, and all my boxes were landed, and Gorei's "tambu" put upon them. For the house I agreed to pay him one axe, four knives, three bead necklaces, three fathoms of cloth, twenty sticks of tobacco, and a flannel shirt.

The following day, June 24th, the ship left me at Alu. In the afternoon of the same day, the chief's son brought me yams and bananas, and insisted on leaving me two women to cook my food, and keep the house clean, as the men did not do such work. At night they attempted to sleep in the house, but I could not allow that, so a sort of verandah at the back was assigned to them.

Next morning I went into the bush to collect, taking my gun, and on returning about mid-day found Gorei waiting for me. I paid him for the hire of the house, and also made him a present. He told me I had only to ask for anything I wanted. I may here add that I found him as good as his word, and that during the whole of my stay our relations were of the most friendly character.

I remained at Alu from the 24th June to the 7th August, during which time I made large collections of the Lepidoptera and Coleoptera, as well as the birds, mammals, reptiles, and batrachians (frogs, &c.) of the locality. I got no new birds at Alu, but my collection contained two new species of bats, while of reptiles and batrachians seven species were found to be new.

Upon the small island of Alu are extensive plantations of yams, taro, and plantains, and it was in these clearings that I did most of my collecting. The sago-palm grows plentifully in the bush, and the leaves of it are used for house-building. Fish are caught daily, and with sago, yams, taro, &c., and an occasional feast of pork, the natives are content. I may say that, with the exception of tea and biscuits, and now and then a pigeon, I depended entirely upon native food during my stay. From pounded yam and taro, flavoured with grated coco-nut and sugar-

cane, they make a kind of pudding which they call "pisu," and this was a constant dish, frequently the only one, at my table. For cooking they use earthen pots, and for serving the food leaves and baskets, while for pounding the vegetables they make use of a wooden pestle and mortar.

Nearly every native at Alu is armed with a Snider rifle, but the original native arms are spears, barbed with the wing bones of *Pteropus*, bows and arrows, and tomahawks. The spears and arrows are not made here, but are imported from the neighbouring large island of Bougainville, whence also they get their baskets and native tobacco. Twice or three times a year an expedition goes to Bougainville to bring slaves and articles of native manufacture, for which they exchange the knives, axes, and tobacco, which the Alu natives buy from the traders.

On two occasions I accompanied the natives on expeditions to the neighbouring island, known as Shortland Island, and both times we had to sleep in the forest. When night was coming on, a place was chosen for camping. Two straight palm stems were selected, growing about twelve or fifteen feet apart on a sloping piece of ground. From these other palms and undergrowth were cleared away. A third palm stem was cut down with two strokes of a tomahawk, and bound horizontally across the other two, at a height of about six feet from the ground. Other shorter palm stems were then cut, and rested against the cross piece from the higher ground, thus forming rafters upon which palm or wild plantain leaves were arranged, and in a few minutes a perfectly dry shelter was formed. Should the ground be damp, other palm stems are cut, and arranged on the ground side by side, resting at each end upon two other stems, and thus a dry if somewhat rough sleeping bench is formed. The whole thing is completed in less than ten minutes. On one occasion it was raining in torrents, and I wondered where my boys would get dry wood for a fire. But they produced a plentiful supply of dry touch-wood from the interior of a hollow tree, and we soon had a cheerful blaze.

Like all the rest of the Solomon Islanders, they are inveterate chewers of the betel-nut, and the old men, after they have lost all their teeth, pound the nut to a paste in a little pestle and mortar, which they carry for the purpose, mixing the lime and betel pepper in the pestle.

On leaving Alu at the beginning of August, I decided on moving to the island of Fauro, about fifteen miles away. A trader and his family were living here, and from them I received the greatest kindness and assistance during my stay. The natives of Fauro belong to the same tribe and speak the same language as those of Alu. I remained there until 17th September and most of the time suffered from intermittent fever, the place being apparently very unhealthy. The fever, of course, interfered much with my collecting, besides taking away all the energy I had for getting about. I did not come in contact with the natives here nearly so much

as I did at Alu, nor did I find them so frank and friendly with me. I left Fauro, without regret, in the small trading steamer *Ripple*, for Rubiana, in New Georgia, where I arrived on September 24th.

Rubiana is a town situated on a small island in the lagoon on the south side of the island of New Georgia. It may be considered the centre of the head-hunting district, for the natives of this and the adjacent islands are most notorious head-hunters and cannibals. Coconut palms grow most luxuriantly round the Rubiana lagoon, and consequently the traders, in spite of the bad character of the natives, have established two or three stations on the small islets studded about the lagoon. The chief of these is owned by a Sydney firm, and it was to meet that firm's schooner *Lizzie*, from Sydney, that the *Ripple* now came to Rubiana.

During my stay of a fortnight at Rubiana I paid two or three visits to the mainland. The most interesting of these I will describe.

I started early in the morning in a boat in company with the captain of the *Lizzie* and the man in charge of the station, for a visit to different towns round the lagoon. Our first visit was to a small island occupied by another trader. This island he is allowed to occupy on sufferance only. It belongs to the natives of Sisieta; they will not sell it, as they use it for their cannibal feasts. I was told that six bodies were eaten here a fortnight before my visit. From here we went to a town called Oneavesi, and thence crossed to the small island of Rubiana proper, where we found nearly all the men away on a head-hunting expedition to the island of Ysabel. I here photographed the interior of a tambu house, the post of which was carved to represent a crocodile. Along the rafters was a row of heads. I also took a photograph of a collection of sacred images, near to which was a heap of skulls, upon every one of which I noticed the mark of the tomahawk. These collections of images are to be found in nearly every town throughout the lagoon, and are strictly tambu. I found out afterwards that the natives strongly objected to my photographing them, or indeed approaching them at all. At another village close by on the same island we again found nearly all the male population absent on the same expedition. The women and those left at home were preparing a feast for them on their return. At the principal canoe-house in another village we visited there were five large head-hunting canoes, profusely ornamented and inlaid with pearl shell. The house was about 80 feet long, with a high-pitched roof, the end being closed in, but two narrow slits being left for the high prows of the canoes to pass through. In this house there were eight heads; I recognised among them the straight hair of natives of the Lord Howe's group, and was told that a year or so previously a canoe containing sixteen of them had been driven from Lord Howe's group to Ysabel, where they have been caught from time to time by the head-hunters. In another canoe-house in the same town I counted

thirteen heads. After some persuasion they carried out the largest canoe for me to photograph. The Rubiana men returned next day from Ysabel with five heads, from three men and two women; they also brought five prisoners alive. During the fortnight that I spent in the lagoon I heard of no less than thirty-one heads being brought home, as follows:—Rubiana village, five; Sisieta, six; Kokorapa, three; Lokorokongo, seventeen.

Finding I could not get rid of my fever, I determined to sail for Sydney in the *Lizzie* for a change; so leaving Rubiana on October 9th, we called at various places in the group, finally taking our departure from Guadalcanar on October 23rd, and arriving in Sydney on the 10th November, 1886.

After a stay of one or two months in New South Wales, I left Sydney on January 24th, 1887, on a second visit to the Solomons. After a rough passage we arrived at Rubiana on February 27th. I, for the second time, spent a fortnight at this place; and having on my previous visit gained the confidence of the two chiefs of Sisieta, named Wange and Ingova, I went frequently ashore at their town. On one occasion I saw the inauguration of a large trough for preparing and pounding food, the ceremony taking place in the chief canoe-house of the town. I was assigned a seat next to Ingova, while above my head were the eight heads previously mentioned. The trough was about thirty feet long, and carved to represent a crocodile. Twenty-two men were seated on each side of the trough, and an old man at either end. They had all their ornaments on, and wore their shields over their shoulders, while their spears and tomahawks were close behind them. The food, consisting of taro, yams, and nuts, was placed in the trough, and the men sat ready. An old man in full fighting rig was then seen advancing towards the house. Walking up to the entrance, he suddenly started back and raised his spear, exclaiming, Basoto (a crocodile), and standing on the defensive. Ingova then advanced from the interior of the house, and placing one hand on the crocodile's head, began a speech which lasted about ten minutes. At a given signal the men began pounding the food, all of them keeping excellent time. When they got tired or hot they were relieved by others, and the pounding was continued for over half an hour. I was then asked to go, and not wishing to offend them, I did so.

The natives of this lagoon were still carrying on their head-hunting expeditions, and had lately brought six heads from Bogotu on Ysabel, one of them being that of a native teacher belonging to the Melanesian Mission.

Leaving Rubiana, the *Lizzie* landed me at Aola, on the coast of Guadalcanar, on the 30th March, and I remained ashore there with the natives until I was taken away again by the *Lizzie* on the 25th September. I had already spent a day or two at this place, and had

found the natives friendly, and, I thought, to be relied upon; so explaining the object of my visit to the old chief Ululu, he and others expressed their willingness for me to take up my residence among them. They sold me a disused house for twenty sticks of tobacco, and built me a kitchen. At this place I had a boy, Hogare, with me, a native of the island of Buka, who had been in Fiji on a plantation. He was working for one of the traders, but expressed his willingness to join me. He acted as my cook, and during my absence on expeditions I always left my house and property in his charge. At the time of my arrival the town was rather upset, as they had returned from a successful raid upon a mountain town, and had killed fifteen people, while just previously they, and the natives of Kuavatu with them, had killed twenty-nine. Two days after my arrival a boy belonging to the town was killed by the natives of the town of Langali; about ten miles along the coast to the eastward. Payment for this boy was subsequently made. I thus spent six months with the natives of Guadalcanar, during the whole of which time my relations with them were of the most friendly nature; I may be said, in fact, to have become one of the community. I was absent from my house on one occasion for a week, and on several other occasions for shorter periods; but although nothing was locked up, I never missed the smallest article.

I made three attempts to reach the mountains of the interior, my object being if possible to have made the ascent of Mount Lammas (8000 feet). The first of these was by the Bokokimbo river, a river that enters the sea close to a town named Ruavatu. The vegetation is here most luxuriant, and composed of large ficus and other large forest trees, with occasional clumps of sago and areca palms, but few coco-nuts. This river I ascended and surveyed for about ten miles, for the whole of which distance it runs through a rich alluvial flat, densely wooded. At the mouth it is of considerable size (70 yards wide) and depth, but above the tidal influence there are many rapids; which made it difficult for me and my two native companions to get our small boat along. In fact we were more often wading than paddling.

The natives we saw appeared surprised to see a white man, and generally at first ran away and hid in the bush, from which they shouted to my two companions, inquiring who the white man was and what he wanted—my men replying that I was buying butterflies, birds, snakes, and stone-axes, and measuring the water. In each case we promised to stop on our way back, as we were anxious to get forward and lose no time. Towards evening we arrived at a prettily situated village named Reko, where my guides proposed that we should pass the night. A wretched little hut was assigned to us, and we were supplied with cooked yams, and the whole population crowded in to inspect me. The next morning I tried to induce my guides to go on, but they steadily refused, saying that they were afraid of the bushmen and

the devil, so I had reluctantly to return, arriving at Ruavatu the same evening.

On another occasion I had walked with some natives from Aola, where I was living on the coast, to a town called Kobua, situated on the river of that name and about four miles inland. While walking along the river bank with my men we heard a number of natives approaching, shouting and making a great noise. I was told they were coast natives returning from a raid upon a mountain town. My men all stood on the defensive with their spears ready poised, and I got my revolver ready, but they proved to be friends. They were very proud of their victory, and told me that they had killed one man and got one alive. I saw the dead man's hand and a piece of flesh carried in triumph by one of them on his spear. I did not see the prisoner, and I was glad to hear afterwards that he escaped. It is these constant raids of the coast natives upon the bushmen and retaliatory ones on the part of the bushmen upon the coast natives that render it difficult and dangerous to penetrate any distance into the interior. I had been over three months at Aola before I could induce the natives to accompany me into the interior, during which time I had surveyed all the lower courses of the rivers in the neighbourhood, and I never lost an opportunity of urging upon Ululu, the old chief of Aola, that he should, if possible, make arrangements for an expedition to the mountains. There was a bushman named Turapara living at Aola, and he at last, upon being shown a considerable amount of tobacco, calico, &c., consented to be my guide on a flying visit to his town Natalava. It was arranged on June 7th, and we were to start at daylight the next morning. When morning came, Turapara's heart had failed him and he had run away and hid himself in the bush, so that I had to give it up for that time. At last, on July 19th, Turapara and seven other natives consented to go, and the whole town came down to my house to see us off. I had taken the precaution of making Turapara sleep at my house the night before, and had locked him in so as to be sure of him in the morning. The Aola natives were anxious on their own account that nothing should happen to me, lest they should be punished for it by a man-of-war, but I promised to leave a notice behind me to the effect that, if anything occurred, the Aola people were not to blame.

Our track lay for the first five miles up the Aola river, which I had already surveyed up to this point; we then left the Aola and followed a track through the dense forest in a west-south-west direction, which brought us in about two miles to the Kobua river, the ground rising at the top of the ridge between the two rivers to a height of 300 feet. The bed of the Kobua river is from this point, and as far as I ascended, about 100 yards wide, and composed of pebbly sandbanks, through which the river itself winds, the actual channel being not more than about 30 feet wide and about knee-deep, running with a very

swift current. This river, like all the others I explored on Guadalcanar, is evidently subject to sudden and violent floods. The Kobua river differs, however, in one respect from the others I visited, viz. that no matter how long there may have been no rain its waters are always milky, whereas the other rivers have beautifully clear water. I regret that I took no photographs on this river, but we were travelling in as light order as possible, and I took nothing myself but gun and revolver, with aneroid and compass, my men of course being armed with their shields, tomahawks, and spears. From the point where we struck the river we followed it up for about six miles in a S.S.W. direction. The scenery was very picturesque, being composed of small rounded sandstone hills densely covered with trees and palms, the hills at first being about 300 feet high, but as we ascended the river they increased in height and size. Occasionally, when the river swept round the base of one of these hills, there would be a low cliff clothed with ferns and other small vegetation. At one point I got a bearing of the high peak known as Vatupusau (4360 feet), which lies about 11 miles as the crow flies south of Aola, but as a general rule the hills near the river prevented any distant view. About midday we came suddenly upon some fresh footprints in the sand of the river-bed, and my men at once sat down and held a council of war, in which I could not get in a word edgewise. At last, after talking for about ten minutes or a quarter of an hour, they said they had decided to refer the question to me. If I decided to go on, well and good, but they strongly advised a return. I told them we were only wasting time, and said we would go on at once. My men were, however, very uneasy, and advanced round every bend of the river with spears poised and keeping a good look-out. About two o'clock we came to a small stream that joins the Kobua river from the westward or left bank, and I was told that our course lay up it. At the place where we left the Kobua river it appeared to continue in a southerly direction, and I was told that a branch called the Sokori, which came down from the northern slopes of Vatupusau, joined it on the right bank. I believe the main stream passes round the west side to the south of Vatupusau, and I am inclined to think it may be found to rise not far from the south coast of the island. At the point where we left the bed of the Kobua river it was 170 feet above the sea by aneroid. This stream was of beautifully clear water, and wound among the bases of the densely wooded sandstone hills, which here rose to a height of 600 feet.

The soil appeared to be extremely rich, as was evidenced by some taro plantations we passed, and I should think eminently suitable for the cultivation of tea.

After following it for about two miles, during which it receives two or three small affluents, I was told that we were approaching our destination, and we halted to bathe in the icy cold water. I was particularly cautioned against putting my clothes upon a certain rock, as

I was told that a "devil" inhabited it, and that he might take offence at me as the first white man he had ever seen. Shortly afterwards we arrived at the settlement of Natalava. This consisted of three miserable hovels, apparently of a very temporary character. The inhabitants consisted of five or six men, six women, and as many children. There was none of the skin disease so common on the coast among these natives, and this I attribute to the constant bathing in fresh water which they must undergo. These natives seemed miserably poor, and their old chief, Pelunango, told me that they had only been there two months, having been driven out of a town called Tintogomo by the natives of Reko, the town I visited on the Bokokimbo river. They gave us some yams, and I and my party lay down on the bare ground in a hut about 15 feet long and 10 wide, together with two or three of the men of the village, I sleeping in my boots in case of having to turn out suddenly in the event of a nocturnal surprise. Next morning, the old man Pelunango apologised to me for having entertained us so badly, and said he would have liked to kill a pig, but he said I could see how poor they were. He gave me as a present four strings of native bead money, and I gave them a lot of tobacco, pipes, matches, and knives. I had intended to visit the town of Tintogomo, but I was told that the bushmen were watching it, so it was decided to return as we had come by the Kobua river. Starting early, and walking fast, we arrived at midday at the place where we first struck the river the day before, and I announced my intention of following the river down to the town of Kobua. After some demur, my men consented, and in about four miles we arrived at the town. I decided to sleep at Kobua that night, and the following morning I surveyed the rest of the river down to the sea at Korumbusu, returning to Aola along the coast.

My next expedition into the interior was undertaken with the object of making the ascent of the mountain peak, called by the natives Vatupusau (4360 feet), which is a conspicuous object from the sea, and which is situated about eleven miles, nearly due south from Aola. There was a man named Beta living in Aola, who was a native of a town named Valemenga, situated on the slopes of this mountain, and it was under his guidance that I was to undertake the expedition.

On Monday, 15th August, Beta, my guide, and another man, together with seven or eight Aola natives, were at my house soon after daybreak ready to start, but at the last moment, Ululu, the Aola chief, sent a message positively forbidding us to leave until Beta and Sosoni had been and arranged for my projected visit. I was much annoyed, as the expedition had already been put off two or three times, and I insisted upon their starting there and then. They did so, returning on Thursday the 18th, when Beta came to my house and said that he had arranged for my visit. Other delays occurred, and we eventually started on the 20th, eleven natives of Aola accompanying me. We followed the Aola

river for about two miles from the sea to a point where a river joins it on the east or right bank called the Bouga river. We followed the Bouga river for about four miles. This is a small stream, and as the forest is very dense, the trees in places almost meet overhead.

Continuing up stream, we left the river-bed at a point where the Kolomelua joins the Bouga, and ascended a track that followed the top of a ridge through dense forest, running in a southerly direction for nearly two miles, and rising gradually the whole way to a deserted town named Vanga-na-Manu 730 feet above the sea. It consisted of five or six well-built houses, and had evidently not been long deserted. This town is situated on the top of the ridge dividing the Bouga and Aola rivers. Descending by a steep track into the bed of the Kolosagata, an important tributary of the Aola river, we crossed it, and again ascending a track following the crown of a ridge rapidly ascended in about a mile to a height of 680 feet, the general direction being rather to the westward of south, and the forest very dense. A very steep and difficult descent of 300 feet brought us down into the bed of the Kolorata, another tributary of the Aola. During a part of this descent we had to let ourselves down by the roots of one of the large ficus trees while at another time we slid or slipped down the channel of a small stream, more frequently sitting than walking. Crossing the Kolorata we again had a steep climb up the other side, the path still taking a southerly direction and bringing us in a mile and a half to Beta's town of Valemenga, at a height of 800 feet above the sea. The town is (or was) situated on the top of a narrow ridge sloping abruptly down on the east and western sides, and was surrounded with a stockade about seven feet high, with a narrow opening, closed at night, through which we squeezed one by one. In weak places sharpened bamboos were stuck in the ground on the inside of the fence to transfix any one breaking through. Walking into the centre of the town I inquired for the headman, and when he appeared I held out my hand to him, which he took, and then he put his arms round me and embraced me. The settlement consisted of ten or a dozen houses and thirty inhabitants. At the time of our arrival the summit of Vatupusau was enveloped in clouds, but just before dark they cleared away and I had a good view of the top, distant from us about two and a half miles.

These natives speak a language that differs in many particulars from that spoken at Aola, and is the same as that spoken at the mountain villages of Natalava, Tintogomo, and Magombu.

At dusk we were conducted to a perfectly clean new house, with as usual the bare ground for floor, and were supplied with cooked yams. After we had finished our meal the whole town crowded into the house, and my men sang a song, and when they had finished the women of the town sang one of their dismal chants. In the midst of the performance, Sosoni, one of my men, suddenly sprang to his feet, and after a

short speech, presented the chief man of the town with three or four sticks of tobacco. I had not intended to make my present before morning; but as I thought the opportunity a good one, I gave Beta an axe, a knife, and some pipes, matches, and a quantity of tobacco, and told him to present them with a suitable speech. Shortly afterwards one of the men of the town stood up, and leaning his two hands upon his tomahawk,* returned thanks. Each man before commencing his speech gave a shrill scream, I suppose to attract attention, but the singing went on the whole time. The house was only about 20 feet by 12 feet, and there were upwards of thirty people in it besides my own men, and they did not show any signs of moving, so at last I was obliged to tell them that we wanted to go to sleep, after which they left the house by degrees.

The following morning, before breakfast, I went, accompanied by two of the bushmen and two of my own men, along a track that rose gradually along the top of the ridge upon which the village was built. At the highest point I boiled my thermometer, and got an altitude of 1140 feet. From this point I had a fine view of the country down to the sea, over which I had travelled the day before. At my feet were the wooded ridges among which the small rivers I had crossed took their rise, while beyond was the great alluvial flat extending to Tasimboko, covered with the densest vegetation. At the foot of the ridge on which I was standing the Aola river wound through a densely wooded valley, the opposite side of which rose steeply from the bed of the river to a height of about 600 feet. The mass of vegetation and creepers upon this slope rivalled anything I have ever seen. The top formed a ridge similar to the one upon which I was standing, and upon the other side of it I was told was the Sokori river, a tributary of the Kobua river. Beyond was the rounded mass of Vatupusau, rising to a height of 4360 feet, and distant only $2\frac{1}{2}$ miles, wooded to the top, the outline of every tree upon the sky-line standing out sharply in the clear morning air.

Returning to the town to breakfast, I found my men uneasy. They had expected the men from Magombu to arrive before this, as they had fired two shots and blown a conch to attract them. While eating my breakfast I again tried to persuade them to attempt the ascent of Vatupusau, but they were unanimous. No one had ever been there, there was no road, they were afraid of the devil and of bushmen. On these four reasons they rung the changes till I was weary. So after breakfast we made a start for home. We had a steep climb of 600 feet down the side of the ridge to the Aola river. Following the bed of the river, we found the walking difficult on account of the large boulders of soapy sandstone, of which the river was full, while at times we were wading breast high. At others, where the river swept round the base of a projection of the side of the valley, a deep pool was formed, too

* Cf. 'Proc. R.G.S.,' 1886, pp. 566-7.

deep for wading, and we had to find a path through the bush. We never, however, left the river for more than a few yards at a time. The steep sides of the valley or gorge through which the river ran rose on either side to a height of 600 or 800 feet, while the luxuriance of the tropical growth baffles description. Every bend of the stream disclosed some fresh beauty, and I regretted that I had no one with me whose pen could better describe the lovely nature of the scenery through which I was passing. Our progress was very slow, as I was engaged in surveying, while my men, who were discontented with their entertainment at Valemenga, all complained of being hungry, and some of them producing from their bags some small square fishing nets, they proceeded to mount them upon canes. The others acted as beaters, and so we fished our way down the river.

Rather more than two miles brought us to the junction of the Kolosagata, which joins the Aola on the right bank. As we proceeded the walking became easier. The large sandstone boulders gradually disappeared (doubtless by the action of the atmosphere and constant grinding in the water). In this way we descended the river all day, I surveying and the men fishing, every bend of the river disclosing some fresh beauty. As the afternoon wore on I became very tired, and began to think that we should never reach the point to which I had already reached from the sea about a month previously, every bend of the river now becoming a fresh disappointment. At last, about four o'clock, I recognised the spot where I had left off my survey, and with a feeling of relief I shut up my compass. We now halted for half an hour while the men cooked their fish and I boiled some tea. Although I had been wading all day, a bath was very refreshing. From this point we made the best of our way home, arriving after dark at Aola, where I found everything well.

Four days after my return, eleven natives, consisting of six men, three women, two little girls, and a baby, arrived from Valemenga, being the sole survivors out of the thirty inhabitants. The town was attacked at daylight, two days after my visit, by the natives of Niuwa, on the Rere river, led by a chief named Ragu. The old chief Tambongi, who gave me the affectionate embrace, was among the killed. These poor people took up their abode at Aola and remained there until I left, and I think it unlikely that they will ever go back to the mountains.

Shortly before I left Aola the natives of Natalava, the other town I had visited on the Kobua river, came to Aola in a body and told me that they too had decided to live with the Aola people as they were afraid any longer to remain at Natalava. I left Aola on the 25th September, and for a fortnight before that date an attack was expected to be made by the same natives of the Rere river that killed the natives of Valemenga. I was told that on two nights they were lying in ambush round our town, but for some reason or other they did not attack. Two

old men and about six or seven old women and some children came every night to sleep in my kitchen for protection.

With the above my second visit to the Solomons came to an end. The ship which I had been expecting for six weeks called and took me away on the 25th September, and we arrived in Sydney on the 23rd October, whence, after a fortnight's stay, I sailed for England, arriving on the 22nd December last.

With the results of my collecting I have every reason to be satisfied. I brought and sent home as the result of my two visits nearly 17,000 specimens, which, so far as they have been at present examined, have been found to comprise three new genera and eight new species of mammals, fifteen new species of birds, six new species of reptiles, and over a hundred new species of *Lepidoptera*.

The Natives and their Customs.—Natives of different parts of the group differ considerably from one another, but they belong to the Melanesian or Papuan type. I believe, however, that on the island of Ysabel there is a strong infusion of Polynesian blood from Ongtong Java, or Lord Howe's Group, as canoes are known to have been driven in bad weather from that group, and to have arrived on the coast of Ysabel. The natives of Buka and Bougainville and of the islands of Bougainville Straits and of Choiseul, are intensely black in colour, but as one journeys eastward the colour changes to a dark brown. They have woolly hair, but occasionally natives are met with wavy, and in some cases straight hair. I attribute this fact to an infusion of Polynesian blood, and have noticed it in natives from Ysabel, also at Fauro. The men wear no clothes beyond the T bandage usually met with among savage races, but frequently men are seen without even this. The natives of Alu, however, wear a small piece of calico round the waist. On San Christoval and the more eastern islands the women wear a small plaited square of grass fibre about six inches by four, which is suspended round the waist by a string and hangs down in front. Upon Malayta they wear the same, but one frequently sees women without even this small sacrifice to decency. On Guadalcanar the women are more decently clad, wearing a series of fringes, one over the other, made out of some vegetable fibre resembling hemp. For working in they wear a similar fringe made out of a shredded banana leaf. The dress of the women of Rubiana and the neighbouring district was declared by Captain Cheyne, who visited the islands in 1846, to be indescribable. A photograph will perhaps best explain the method of wearing the scanty clothes they carry. At Alu the women wore pieces of calico bought from the traders. These Solomon natives are not so addicted to the practice of tattooing as the lighter coloured Polynesians, probably because the patterns would not show so conspicuously upon their dusky skins. In San Christoval, however, both men and women have frequently the face cut all over with a pattern of chevron-shaped cicatrices. And on Guadal-

canar the same practice is in vogue, but the pattern takes the form of small circles, which are traced by a sharpened bone from the wing of the flying fox, and a small bamboo with the edge sharpened. The operation, which is completed at one sitting, is a particularly painful one, and the operator is highly paid for his trouble, tattooing being a profession.

While I was at Aola a boy was tattooed who had come twelve miles to secure the services of a native tattooer, a great friend of mine, called Muri Lan. I did not see the actual operation, but he was brought to me next morning to be inspected. He was in a painfully nervous and feverish state, and evidently suffering great pain, while his face was puffed up to a fearful size. He was in charge of the women, who made a place on the edge of the salt water for him to lie down in on his stomach, and scraped a hole in the sand where he could from time to time dip his fevered face in the water, a few branches being stuck in the sand to keep the sun off. In a few days he was quite recovered. Many of these natives pierce, and gradually distend the lobe of the ear, and enlarge it by degrees until at length it attains an enormous size. On San Christoval a circular disc of soft white wood from 2 to 2½ inches in diameter is carried in the hole, but at Rubiana the hole was kept stretched by pieces of sago-palm leaf, or pandanus leaf, which were bent into a hoop, and by constantly exerting a pressure, tended to enlarge the hole. A boy whose photograph I took at Rubiana, had the hole in his ears enlarged to a diameter of at least four inches. They are excessively fond of, and prize highly armlets made from the shell of the giant clam (*Tridacna gigas*), and among the eastern islands, Malayta, San Christoval, &c., they are worn of very large size, and I regret that I was unable to purchase any, although I offered a considerable price. A native chief whom I saw at Santa Anna with a remarkably fine pair told me he had given a boy for each. At Guadalcanar, Rubiana, and to the westward they take rather the form of bangles, and as many as eight or ten are frequently worn on each arm. Large crescents cut out of pearl-shell are frequently worn round the neck, and especially on Malayta frontlets of a white cowry. Perhaps, however, the ornament most highly prized is a necklace of dogs' teeth. A good necklace will consist of five hundred teeth, each one being carefully bored and mounted with great ingenuity. As only two teeth are available from each dog, it would require 250 dogs to make a necklace such as I refer to. On San Christoval, where most of the dogs' teeth come from, I am told that they extract the teeth from live dogs, burying them up to the neck in the ground for the purpose. Porpoise teeth, cuscus teeth, and the teeth of the flying fox are also used, but are not so highly valued as dogs' teeth.

The natives of Rubiana and New Georgia also wear a neck ornament known by them as a *buckea*. This is a ring cut from the solid shell of the *Tridacna gigas* and suspended round the neck by a sort of plaited red straw. The *buckea* is more highly prized if it possesses a peculiar

yellow stain, and I am told that the best are made from shells that are found as fossils in the bush in regions of coral upheaval.

I must not forget to mention the strings of bead money, generally about a fathom in length, which are made from shells at the expense of great labour. It is of two kinds, red and white, the red being more highly prized by them.

Their weapons are bows and arrows, spears, clubs, tomahawks, and defensive shields. But while the natives of San Christoval and Malayta use the arrow, spear, and tomahawk, I never saw on Guadalcanar any arrows or bows except those used for bird-shooting. At Rubiana and New Georgia also arrows are not used, the tomahawk and spear being preferred. But it is on Bougainville that the finest specimens of arrows and spears are found. In fact the latter, barbed with the wing-bones of the flying fox, are eagerly sought after and bought by the natives of the more eastern islands, the Alu natives paying two or three visits a year to Bougainville for the purpose of buying spears, arrows, baskets, and other things in the manufacture of which the Bougainville natives excel.

Many of the natives are now armed with Snider rifles or muskets, which used to be supplied by the traders, but at present the English traders resident in the group are forbidden to supply the natives with firearms, and my observation goes to prove that the regulation is observed. A few are, however, introduced by traders actually or nominally under the German or American flag.

Perhaps the thing that most strikes a stranger visiting the group is the beauty of shape and decoration of the canoes. These vary in size from the tiny thing just able to support a boy of twelve, to the great head-hunting canoes, capable of carrying fifty or sixty men. They are built of planks laboriously adzed down from the solid tree, and are sewn together with a tough vegetable fibre, the seams being caulked with a sort of putty scraped from the kernel of a nut (*Parinarium laurinum*) that grows plentifully in the bush. This vegetable putty sets perfectly hard in a few hours, and is quite water-tight. The canoes are ornamented exteriorly at bow and stern with white cowry shells and inlaid with pieces of pearl-shell cut into patterns, and at the bow end, just above the water-line, is often a small human-shaped figure-head. These canoes are propelled solely by paddles, being unadapted to sailing, and being long, narrow, and light for their size, they travel at a great rate.

Except perhaps on Bougainville, the use of stone implements has gone out among these natives, but while at Guadalcanar I obtained more than two hundred stone adzes. These were brought me by the natives, and were for the most part dug up by boys upon the sites of old houses. I asked an old man to mount me one upon a wooden handle in the correct way. The same form of handle is still used, but a plane-iron is now employed instead of the stone axe. With these they cut out

their canoe planks and fashion the wooden bowls in which they serve their food.

The houses vary in shape somewhat in different parts of the group, and in Florida and Fauro houses built on posts may be seen. On Guadalcanar the eaves of the roof come right down to the ground. The material is always the same, the leaf of the sago-palm, which makes a durable and dry roof. There is no floor but the bare ground, but rough couches are made of palm stems laid side by side and raised from a few inches to a couple of feet from the ground. They are most uncomfortable to sleep upon, being very hard and rough, and invariably too short. A fireplace is made in the centre of the house, and the smoke finds its way out through the door or through the roof or sides of the house. Strings of pigs' jaw-bones, cuscus and flying-fox skulls, fishes' bones, turtles' heads, and sometimes human jaw-bones may be seen strung on strings along the rafters as mementoes of former feasts, but the human heads, at least in the head-hunting districts, are reserved for the canoe-houses. These are larger and better built than the ordinary dwelling-houses, and are *tambu* (tabooed) for women, i. e. a woman is not allowed to enter them, or indeed to pass in front of them.

These natives cultivate several kinds of yam, the bread-fruit, bananas, taro, tobacco, betel-palm and pepper, and the coco-nut. In the western end of the group sago is an article of extensive consumption, but no attempt is made to cultivate it, as a plentiful supply is found growing wild. On Guadalcanar and eastern islands they do not know how to manufacture the sago, but in times of scarcity they are in the habit of baking pieces of the pith of the tree and eating it. I saw sago prepared at Alu, and it was washed in salt water, which, however, had very little effect upon the flavour of the sago.

Both men and women take their parts in the gardens; felling the trees, and fencing against wild pigs being men's work, while the actual gardening, planting, weeding, and digging, is done by the women. On Guadalcanar, after felling a piece of bush for a garden, they do not burn it off, but leave the fallen trees on the ground. The work is somewhat desultory, but they put a good deal of energy into it at times. They are, however, always ready for a pig-hunting expedition, or two or three days' fishing or feasting. Having few wants, blest with a climate in which the rudest methods of cultivation produce abundance of food for their use, they ought to be a happy and contented race, and no doubt were security to life more assured, they would be. But a man would as soon think of going to his garden of a morning without his spear and tomahawk as an Englishman would of wearing his hat in church. The greatest distinction a native can earn is to have taken a life, and it matters not whether it is an old woman surprised working in her yam patch, or a man surprised and killed in the bush, the glory is just as great. Such a thing as a fair stand-up fight between equal numbers I

never heard of. This renders them suspicious in the presence of strangers; always ready for treachery themselves, they are constantly suspecting it in others. Having given them a bad character in their dealings with one another, I must in justice say that my own relations with them were throughout of the most friendly character, and both at Alu and at Aola on Guadalcanar, I met with the greatest kindness and assistance from both chiefs and people. I have at both places left my house for as long as a week at a time, and come back to find everything in perfect order and precisely as I left it, and although nothing was locked up, I never missed so much as a stick of tobacco. So much for heathen honesty.

The shark is held in high veneration among certain of these natives, and notably upon the island of Savo. The Savo natives say that their island was made by the shark, who carried the stones there and planted yams and coco-nuts, and put upon it men and women, and the bird known as the megapode. The megapodes increased so rapidly that they began to make havoc by digging in the yam patches. The men went to the shark and asked him to take the megapodes away. This was done, but now the men missed the megapode's eggs, which are a favourite article of food with them. They accordingly went again to the shark and asked him to bring the birds back, but to confine them to one place. This request was also complied with. The result may be now seen; the megapodes lay their eggs on two large open patches of sandy ground, which are several acres in extent, and nowhere else on the island. These laying-grounds are fenced off into small divisions for different owners, and I am told that several thousands a day are taken out of them. I myself bought eighteen eggs for the value of three-halfpence when calling there.

As I said above, the Savo natives worship the shark, and the sharks at Savo grow to a great size, and are extremely bold. At the time of a child's birth the mother decides whether it belongs to the land or the water. If to the latter it is thrown into the sea at death with all the property it may have accumulated during life. If the mother declares it belongs to the land, it is buried ashore, the property also being buried with it, which strange to say is always found to have been stolen a few days afterwards by the *devil*.

These natives believe in the power of some of their number to produce rain, while I met with a belief in the existence of a man in the moon, which was related to me by a native of Aola named Muri Lau, as follows. There was a girl named Leonivulu, whose father's name was Tuasakai. Leonivulu wanted to marry a good-looking young man named Silitamburara, and her choice was approved of by her father Tuasakai. There was another man named Gengoukouka, a cripple of one leg, also in love with Leonivulu. Meeting her walking on the shore one evening after dark he personated Silitamburara, and prevailed upon Leonivulu

to accompany him to his house. Here she discovered the deception and escaped next day, and complained to her father. Tuasakai was very angry, and pursued Gengoukouka with the intention of killing him, but he fled for safety and got to the moon, and has remained there ever since, where he is employed in making the white shell armlets out of the large clam shells: presumably he completes one every month.

I cannot conclude my description of the natives and their customs, without some reference to cannibalism and head-hunting. I may state that very few white men have ever had the good fortune to see a cannibal feast,* as the natives, knowing the detestation in which the practice is held by white men, always keep the occurrence as quiet as possible. On one occasion only did I ever see human flesh, and the owner assured me he was not going to eat it. I never heard of cannibalism the whole (six months) time I was living at Aola on Guadalcanar, and the natives, in answer to my inquiries, most strenuously denied the practice, but this of course they would do. On San Christoval it is said to be common, and bodies are hawked about for sale from town to town, and the same is the case on Malayta. The head-hunters of New Georgia and the neighbouring islands are also notorious cannibals, while my own boy Hogare, who was a native of the island of Buka, confessed to me that the practice was common there. Not only will the New Georgian natives eat the bodies of those killed in battle, or prisoners, but they will exume the bodies of people recently buried for their disgusting purpose. The following was told me by a white trader who lived formerly at the small island of Lilehina in the Marovo lagoon. This man had living with him a Polynesian woman from the Lord Howe's Group, and had had a child by her. The child died and was buried, and the trader had to leave home the same day. During the night the natives from the mainland came across in a canoe, and dug up the body. The mother actually saw them at work with torches at the grave, but was too frightened to leave the house. She lost her reason for some time afterwards.

I have the following story from another trader:—At a town near Cape Pitt, on New Georgia, lived a chief named Rakatu, who related the following to my informant. Rakatu had a half-brother named Maro, who had lately lost his young wife, of whom he was very fond. Maro being much grieved at her loss, instead of taking her body to be thrown upon the small island upon which the bodies of the dead were usually exposed, buried her himself in the bush near his own house. The same night, a moonlight one, he visited the grave, and found that two old men of the town had exhumed the body, and were eating it raw, being then engaged upon an arm. Upon seeing him they decamped, and he did not follow them, as they have a superstition that when people take to such practices they are possessed by a devil. Rakatu said that several children had mysteriously disappeared lately, and it had been laid to the charge of the crocodiles, but that they now suspected these two old men. He

* See Romilly, 'Western Pacific and New Guinea,' for a good description of one.

would not mention their names, and said that they had superstitious prejudices against putting them out of the way themselves, but that they would engage some one belonging to another tribe to do it for them. This occurred at a place where cannibalism was a matter of constant occurrence.

Throughout the group one constantly sees human skulls hung up either in or outside the houses, but it is from New Georgia and the adjacent islands that head-hunting is carried on to its fullest extent. Among these natives it appears to be a perfect passion. No canoe-house can be completed and no canoe launched without a head being obtained. They make long voyages in their large *tomakas* or head-hunting canoes, for the purpose of securing heads; the chief hunting-ground at the present time being the two islands of Choiseul and Ysabel, 90 to 100 miles away, which, however, are becoming somewhat "worked out." The basest treachery is often employed. They will at times visit a village as friends, and after staying for a day or two, at a given signal turn upon their hosts, and either kill them or take them alive. Such a case occurred while I was at Rubiana. At other times they will surprise or cut off a party fishing on the reef, and no matter whether they are men, women, or children, the heads count. The heads, after being slightly smoked, are stuck up along the rafters of the roof in the canoe-houses, and I have myself counted thirteen recent heads in a house at Sisieta. Occasionally the head-hunters themselves meet with reverses; and while at Rubiana I inquired the reason of some particularly fine coco-nut trees having been cut down; I was told that it was in consequence of the death of a chief who was killed on a head-hunting expedition to Ysabel. Just before I left the group two white traders were killed for their heads at an island named Rendova, about 10 miles from Rubiana, the occasion being the launching of a new canoe.

At the same place two white men and three natives, belonging to the schooner *Elibank Castle*, were killed in November, 1884, while an old man named Childs was murdered on the 12th September, 1885, at a neighbouring island. All these murders took place solely for the sake of the victims' heads. Men-of-war have visited the place after each of these murders, but have been unable to capture the culprits, as the natives retire to the bush upon the appearance of a man-of-war off the coast. It has not been considered safe to follow the natives into the bush, but I believe the danger to be more fancied than real, as I have fully proved the cowardly and timid nature of these natives. As I mentioned previously, during my first visit to the Rubiana lagoon no less than thirty-one native heads were brought home in a fortnight, while the two large islands of Choiseul and Ysabel have been nearly depopulated; and if not for the protection of the white traders, who of course go to the islands at their own risk, yet surely in the interests of humanity itself, some effective measures should be taken to put a stop to such wholesale slaughter. I may state that I have communicated with Her Majesty's High Commissioner for the Western Pacific on the subject.

Dr. GUPPY said he had had the greatest possible pleasure in listening to the paper, because he had lately been to the Solomon Islands. The conditions under which Mr. Woodford worked were far more difficult and dangerous than in his own case. He (Dr. Guppy) was attached to a man-of-war, but Mr. Woodford was entirely by himself, living with the natives, and exposed to many risks and privations. It was perhaps difficult to realise the feeling of one who was left on the beach by a trading ship in the way Mr. Woodford was, among a number of savages whom he had never seen before, and with whom he had to stay for several months. Mr. Woodford's adventures reminded him of those of Baron Macclay on the coast of New Guinea. About thirty years ago Mr. Benjamin Boyd visited the south coast of Guadalcanar, with some idea of annexing the islands. One morning he went ashore from his yacht to shoot pigeons, and he was never seen again. A man-of-war subsequently left a great number of knives and other articles there with the initials "B.B." upon them. Mr. Woodford was the first white man who had really penetrated the island. His collection of photographs was certainly the best ever obtained in the islands, and perhaps in the Western Pacific. His own experiences in photography were not very successful. His great object was to examine the rocks, and he did not think it was likely to obtain a very extensive collection of minerals from them, with the exception of iron pyrites and copper pyrites. A few days ago he read a report of the Paris Geographical Society, in which reference was made to a French captain who, forty years ago, found in Rendova, in the middle of the Solomon group, what he called a large vein of copper, but he (Dr. Guppy) did not think there was any chance of minerals in large quantity being found there. He had known traders mistake veins of the pure mineral, serpentine, for malachite.

Mr. P. L. SOLATER expressed the indebtedness the naturalists of this country were under to Mr. Woodford for the great collection he had made in nearly every branch of natural history. His specimens had been excellently worked out by the naturalists at the British Museum, and most interesting papers upon them had appeared in the 'Proceedings' of the Zoological Society.* It was not often that collections were brought to this country in so excellent a state.

The PRESIDENT proposed a vote of thanks to Mr. Woodford for the paper he had read, the beautiful illustrations he had shown, and the excellent work he had done in making his collections. It was to be hoped that all other travellers who went into distant parts of the earth would follow his example and bring back in the same way specimens of the wonderful productions they met with. He hoped that others would be induced to penetrate into the islands of the Pacific which were at present little known.

* The following is a list of the papers:—

- (1) On the Bats collected by Mr. C. M. Woodford in the Solomon Islands. By Oldfield Thomas (Plates xxv. and xxvi.). 1887, p. 320.
- (2) A List of the Birds collected by Mr. Charles Morris Woodford in the Solomon Archipelago. By W. R. Ogilvie-Grant (Plate xxvii.). 1887, p. 328.
- (3) Second Contribution to the Herpetology of the Solomon Islands. By G. A. Boulenger, F.R.S. (Plate xxviii.). 1887, p. 333.
- (4) Third Contribution to the Herpetology of the Solomon Islands (Collection C. M. Woodford). Read February 7th, 1888. By G. A. Boulenger.
- (5) On some new species of Birds from the island of Guadalcanar (Mr. C. M. Woodford's Collection). By R. B. Sharpe. Read 6th March, 1888.
- (6) Second List of the Birds collected by Mr. C. M. Woodford in the Solomon Archipelago. By W. R. Ogilvie Grant. Read 6th March, 1888.
- (7) Note on *Ornithoptera Victorice*. By Osbert Salvin (Collection C. M. Woodford). Read 7th February, 1888.

Exploration of route between Assam and Upper Burma.

THE Hukong Valley expedition, formed for the purpose of exploring part of the intermediate country between Assam and Upper Burma, and also of determining the question of the existence of a practicable route between India and China, left Dibrugarh under the orders of Mr. J. F. Needham on the 3rd January. Captain St. J. Michell, of the Quartermaster-General Department, and Mr. Ogle, of the Survey of India, together with a detachment of fifty Gurkhas, five military elephants, and one hundred coolies, accompanied him, and the party crossed the Patkoi range on the 19th of January. Between the last British civil station in Assam and the summit of the Patkoi range, lies a great belt of dense tree jungle and mountain land, the latter inhabited by the tribes who destroyed Captain Badgley's party in 1873. All previous travellers during the last fifty years, e. g. Griffith, Peale, Jenkins, and Woodthorpe, concurred in stating that the difficulties in crossing this range were considerable. The information in the possession of the Intelligence Department showed that in the only part of the country where a suitable route was likely to exist, the slopes up to the crest of the range were clothed with an uninhabited virgin forest, while the people in the vicinity would probably afford no assistance. At Makum, the base, the local coolies who had promised to carry the stores up the course of the Dihing river failed to turn up, so boats had to be used instead, though the stream was very low, and after much difficulty the stores and provisions were eventually brought up to Nimrong on the Namphuk on the 12th January. Here the elephants which should have been in waiting on that date, were not forthcoming, so Captain Michell with seventeen fighting men pushed on with the five military elephants, leaving Mr. Needham and Mr. Ogle to follow when their transport arrived.

The march over the mountains proved difficult on account of incessant rain, ignorance of the route, and the hard work involved by cutting a path through the brushwood for the elephants, but the gradients were not difficult, the rise from Nimrong (920 feet) to the top of the Patkoi Pass (4200 feet) being very gradual and spread over 30 miles, while the descent on the other side was much the same as far as the Turong river, beyond which there is no ascent until the plains of the Irawadi are reached. It was, however, impossible for Captain Michell to travel by this route, as he had to make for a point on the Yogli route, where the inhabitants (Naga-Singphoo) had been requested to lay out depôts of provisions on the 24th of January. The two branches of the expedition met at Khatung, but for several days supplies were unobtainable, and on the evening of the 30th food for only four days was brought in. Under these circumstances further exploration by a small and weak party would have been risky—but this was of less consequence

as it had been satisfactorily proved that a route fit for road or rail did exist.

After most fatiguing marching beyond in various directions for fifteen or sixteen days over what is described by the explorers as a breakneck country, the plain of Burma at last came in view, and it was hoped that the detachment under Captain Triscott and Major Adamson, who were expected to march from Mogoung on the Irawadi, about 70 miles distant, would have been here met, but there were no signs of them to be seen. The exploring party then commenced its return journey through a difficult country, but one which nevertheless gave an opportunity of opening up friendly relations with the Singphoo Naga tribes. Mr. Ogle, in spite of continued exposure and danger, had succeeded in mapping out about 2000 square miles of country, and in satisfactorily settling the question as to a route between India and Upper Burma. The future line of road will run from Makum, the railway terminus near the Brahmaputra, to Mogoung, near the Irawadi, by way of the Ningoung Lake, and across the upper course of the Chindwin, a distance of about 300 miles in all. From Mogoung on the Irawadi to the frontiers of China is a five days' march.

GEOGRAPHICAL NOTES.

General Prejevalsky's New Expedition.—It is announced that General Prejevalsky will start upon his fourth expedition to Central Asia in August next. The traveller will be accompanied by an escort of twenty-eight men, including twelve Cossacks; Lieutenant Roborovsky and Sub-Lieutenant Koslov will be his scientific companions. The expedition is planned for two years, and its explorations will be principally confined to Tibet, the town of Lhasa being its objective.

Recent Explorations in French Sudan.—We have already briefly referred* to the valuable exploration and survey work carried out during the last two years in this part of Africa by various French officers, under the direction of Lieut.-Colonel Gallieni, but were unable, as the results were not published, to notice it at all fully. The results of the various missions, apart from that of Lieutenant Caron, are summarised by Captain J. Vallière, of the French navy, in a paper which appears in the 'Quarterly Bulletin' of the Geographical Society of Paris (1887, Part 4), accompanied by an excellent map, on the scale 1 : 250,000, embodying all the recent surveys made in the interior of Senegal. A glance at this map will show how largely our knowledge of all this region has been increased by these expeditions. The country of Bondou, hitherto only known by the itineraries of Mungo Park and other travellers, who, as a rule, followed

* 'R. G. S. Proceedings,' 1887, p. 509.

the same routes, has been thoroughly surveyed by MM. Fortin and Leforte, who penetrated across the country to the confines of Uli. The district of Bambuk, comprising all the territory lying between the Faleme, Senegal, Bafing, and the country of Konkadugu, was two years ago the least known part of French Sudan. A large party of officers have executed complete surveys of the whole region, and have collected some interesting information as to its inhabitants, who number 20,000. The military columns, which operated so successfully against the Marabout Mahmadu Lamine, did some valuable topographical work in the unexplored country which forms the divide between the Senegal and Gambia. This district is occupied by five small confederated states, viz., Uli, Diaka, Nieri, Tenda, and Gamu, with a total population of about 13,000. It consists of undulating plains of small elevation, covered with arborescent vegetation, with stony patches at intervals. The vast grassy and marshy plains, which extend on every hand, afford land for cultivation, but there are large and very sparsely populated tracts of country which are the haunts of elephants and wild beasts of every kind. The most important of the various missions was that of Captain Oberdorf to Dinguiray, situated to the south of Bambuk, which resulted in an exploration of the Upper Gambi to 12° N. lat., and also of the Upper Faleme and Bafing. Existing maps, especially as regards the Faleme, will have to be considerably altered. This river does not rise from the plateau of Timbo, but from the Koy Mountains. The Tene, hitherto regarded as the upper course of the Faleme, is an affluent of the Bafing. Another result is to show that the navigability of the large tributaries of the Senegal cannot be depended upon; these rivers present some fine open reaches, but there are frequent rapids and falls between them. Captain Oberdorf concluded treaties with all the tribes of the regions traversed, except the people of Koy. The mission under Lieutenant Reichemberg visited Konkadugu, Bafe, Solu, and the left bank of the Bafing. It is reported that valuable auriferous bearings exist in the first-named district, but this has yet to be verified. The Uassulu mission, directed by Captain Peroz, may be said to have been a complement, as regards the south-east, to that of Captain Oberdorf. Its chief result was the conclusion of a treaty with the powerful ruler, Almanay Samory, by means of which the frontiers of the French possessions are extended to the banks of the Niger and the Tankisso, and its Protectorate to the confines of Liberia. From a geographical point of view, the results of the mission were, the survey of the valley of the Milo as far as Bissandugu, and of the Bure and Upper Bafing; some interesting meteorological and other observations were made. Dr. Liotard has carried out a geological and botanical exploration of the following regions: Gangaran, Gadugu, Manding, and Bure. Finally, the results of the mission to the east under Dr. Tautain and Lieutenant Quiquandon, the object of which was to visit Great Beledugu and the left bank of the Niger, although not yet fully known, are stated

to be important. The expedition visited Murdia, Gumba, Segala, and Sokolo. Gumba was found to be a village of from 1500 to 2000 inhabitants, and not a large town, as stated by Dr. Lenz. The soil of the country towards the north-east becomes less and less fertile. The travellers came across the beds of rivers entirely desiccated. The country is perfectly analogous to South Algeria.

Cameroon Mountain.—Two Swedish colonists, MM. Valdau and Knutson, have recently done some interesting geographical work in the Cameroons territory. In February 1887 M. Valdau, in the course of a journey made for commercial purposes, explored the northern slopes of the range, which are very thickly peopled by the Bomboko tribe. The main chain of the mountains does not extend as far as $4^{\circ} 30'$ N. lat., as the highest point attained by the traveller, about $4^{\circ} 28'$ N. lat., only measured 2850 feet.—An excursion undertaken in July last by M. Knutson resulted in the discovery of the mouth of the river Memeh. This river has been supposed by some to be a tributary of the Rio del Rey, by others a tributary of the Rumbi. It is now ascertained that it empties itself into the sea a little to the south of the Rumbi. M. Knutson ascended the river, and found it to be navigable for about 30 miles, as far as the Düben Falls at Ekumbi-ba-Ndene, which point was reached by M. Valdau from the south by quite a new route. The falls are 100 feet in height.

Peak K. proposed to be called Godwin-Austen.—Lieutenant Young-husband's adventurous passage over the Mustakh Pass, on his journey from China by way of the Gobi plateau, and Eastern Turkistan to India, of which an account was read at the Evening Meeting of the 14th May, and will be published in the 'Proceedings' of July next, has drawn attention to the circumstance that the second highest mountain which has as yet been measured on the surface of the earth is unnamed and almost unknown to the world in general. It is situated on the range of mountains which is crossed on the east by the Karakoram Pass, and on the west by the Mustakh, and is the highest peak of that range, rising to over 28,250 feet above the level of the sea. It was discovered and fixed nearly thirty years ago, in the course of the operations of the Great Trigonometrical Survey, under Major Montgomerie, and in the Survey Department continues to this day to be known by the symbol which was originally attached to it by the surveyors, viz. K_2 , implying that it is the second very conspicuous peak, counting from left to right, of a range seen in the far distance which was supposed to be the Karakoram range. No name by which it is known to the natives of the nearest habitable regions has yet been discovered. In this respect it is analogous to the highest peak yet measured on the earth's surface. Both peaks were discovered in the fifth decade of the present century, and Sir Andrew Waugh, who was

then Surveyor-General of India, finding that the highest peak had no local name which could be ascertained, called it "Mont Everest," after his eminent predecessor, in fulfilment of the duty which had devolved on him of assigning "to this lofty pinnacle of our globe a name whereby it may be known among geographers, and become a household word among civilised nations." That neither peak has a native name which has as yet been discovered is most probably due to the circumstance that both are surrounded by peaks not very much less lofty, which shut out the view of them from the nearest habitable regions, and are such conspicuous and prominent landmarks that they are designated by well-known names. K_2 is not 750 feet lower than Mont Everest, and is thus of very slightly inferior importance; obviously therefore it should be honoured with a name whereby it may become better known to geographers and the world in general. Thus in the discussion which followed the reading of Lieutenant Younghusband's paper, General J. T. Walker (late Surveyor-General of India) proposed that the Survey symbol K_2 should be dropped, and the peak named Godwin-Austen, after the first surveyor of the Mustakh ranges and glaciers, which he described in a paper read before the Society in January 1864, and published in the Journal of that year. Sir Henry Rawlinson seconded the proposition, which received the general assent of the meeting.

The Project for a Railway between South-west China and British Burmah.—*A propos* of the scheme for a railway connecting the province of Ssu-ch'uan with Burmah, which was propounded by Mr. Holt. S. Hallett* before the Society more than two years ago, Mr. Bourne, late British consular agent at Ch'ungking, says in a report on the trade of the province of Ssu-ch'uan itself, recently published by the Foreign Office (No. 305), "The proposal to construct a railway from Burmah or Tonquin across Yün-nan appears to the writer, who has travelled for four months over the mountains of that province, to be quixotic, as affairs now stand; at all events, it may safely be relegated to the distant future. The exchange of products—opium and cotton, for instance—is not between Ssu-ch'uan and Yün-nan or Ssu-ch'uan and Europe, but between Ssu-ch'uan and the plain of the lower Yang-tzu." As regards the trade of Ssu-ch'uan, the report gives the following as the principal exports of the province—opium, salt, drugs, and silk. The first-named is grown all over the district, and the trade in it is the largest and most profitable of any. Sugar was also largely exported in 1886 to the Eastern Provinces, and excellent tobacco is grown on the north of the Ch'eng-tu plain and exported down the Yang-tzu. The imports have remained almost stationary during the last few years. The demand for foreign goods in Ssu-ch'uan, always luxuries, depends much on the nature of the rice harvest. In

* 'R. G. S. Proc.,' 1886, p. 1 *et seq.*

1883 the province suffered from excessive rainfall; in 1884 from drought; in 1885 from partial drought; but in 1886 the rice harvest was all that could be desired. The result of the latter is seen in the returns of the first few months of 1887. The greatest obstacle to the development of this trade is, according to the report, the break in the commercial intercourse caused by the rapids of the Yang-tzu. The whole of the Ssu-ch'uan trade with the East suffers from this obstruction. The writer is of opinion that the improvement of the navigation of the Upper Yang-tzu is a work that will have to be inaugurated by foreigners or undertaken under foreign pressure.

A Discovery in the Arctic Ocean.—According to the 'Ymer,' the organ of the Geographical Society of Stockholm, Captain Johannesen last summer, the sea being very free from ice in the vicinity of Nova Zembla and Spitzbergen, succeeded in reaching an island situated to the east of Spitzbergen, in $80^{\circ} 10'$ N. lat. and $32^{\circ} 3'$ long. E. of Greenwich, which is a table-land rising to a height of 2100 feet. It is believed to be the same as Hvide O, seen by Captain Kjeldsen, and on 28th August 1884, by Captain Sørensen. This discovery confirms the existence of an archipelago extending from Spitzbergen to Francis Joseph Land. This archipelago would prevent the polar ice from descending into Barents Sea, and would consequently have a great influence on the climate of the north of Europe.

Northern Interior of British Columbia.—In the Summary Report of the Geological Survey of Canada for 1887, some of the results are given of the expedition under Dr. G. M. Dawson last summer for the exploration of British Columbia, referred to in 'Proc. R.G.S.,' p. 758, 1887. The geographical, geological, and general results of the work are now in process of elaboration. Mr. Ogilvie's instrumental survey to the intersection of the Yukon with the 141st meridian, will form a sufficiently accurate base line for future explorations in this region. In addition to this, the geographical results include the completion of an instrumental survey of the Sitkine to Telegraph Creek by Mr. M'Connell, which is connected with Dease Lake by a carefully placed traverse by Mr. M'Evoy. Thence a detailed running survey was carried by the Dease, Liard, and Pelly rivers, connecting with Mr. Ogilvie's line at the mouth of the Lewis river, a total distance of about 900 miles. Taken in connection with Mr. Ogilvie's measured line, these surveys include an area of over 6000 square miles, the interior of which is still, with the exception of reports received from a few prospectors and from Indians, a *terra incognita*. The same remark may be applied to the whole surrounding region outside the surveyed circuit, but much general information has been obtained respecting the entire district, which will facilitate further explorations. The whole region is more or less mountainous, though intersected by wide areas of flat or rolling country. The

north-east margin of the belt of coast mountains may be said to be at Telegraph Creek, on the Sitkine. A second important range runs in a general north-west by south-east course to the east of Dease Lake, and is cut through by the Dease river. To the east of this no high or well-defined range was met with till the vicinity of Frances Lake was reached. Here a range, which may be accepted as the western part of the Rocky Mountains proper, is found with a similar trend to the east, and in this the streams feeding Frances Lake and the Pelly river rise. On the lower Pelly and Lewis rivers, the mountains are less considerable, and assume a direction approximating more nearly to east and west. As to the general climatic features of the region explored, the very humid conditions of the coast do not extend to the interior, which includes some tracts of very dry country, and in the mountains of which glaciers seldom occur, if at all. The country, though generally mountainous in character, includes large tracts of flat or slightly broken land, and, according to Dr. Dawson, may eventually support a population as large as that found in corresponding latitudes in Europe.

The Condition of Trade in the Provinces of Rio Grande do Sul and São Paulo (Brazil).—The deplorable state of commerce in Rio Grande do Sul, the most southerly of the Brazilian provinces, is the subject of special comment by Mr. C. W. Bennett, our Consul at the port of Rio Grande, in his report of last year (No. 323). This important province, with an area of 118,755 square miles and an estimated population of nearly 1,000,000, is being ruined, says the writer, by the fiscal system of the Government, and the want of proper means of communication and of an outlet for its exports. High tariffs and contraband traffic combined have closed nearly all the British importing houses, and it is stated that it is impossible for any importing merchant to carry on an honest business profitably in any of the three chief towns of the province. The cattle industry—the only one worth considering—is decaying, and no provision is being made to establish a trade to take its place. Meanwhile the energetic Argentines and Uruguayans are pushing forward railway after railway to the Brazilian frontier, and threaten to turn the province completely into a commercial vassal. The colonies of the province are stated to be a mine of future wealth if properly looked after; but if the Government of Brazil continues to pursue its present oppressive fiscal policy and neglects the interests of the commercial community, a valuable province, larger than Italy, will be ruined. The report gives no details as to the amount of the exports or imports.—Our Consul at Santos, the chief port of São Paulo, reports more hopefully of the state of trade in that province. Coffee continues to be the sole article of export, and the prices which ruled last year were so high that the planters have felt little inducement towards other cultivation. There is a prospect of a very large crop for next season, but the continued decrease in the use of coffee by the poorer classes of France,

Germany, and the United States in consequence of the high prices, is a very serious matter for Brazil, especially for the provinces of São Paulo, Rio Janeiro, and Minas. The coffee exports from Santos in 1887 amounted to 103,638 tons, valued at 7,254,000*l.*, as against 121,331 tons in 1886, valued at 4,314,277*l.* No statistics as to the imports are published, but it has been ascertained by the Consul that they have doubled within the last ten years. Immigration during the past two years has considerably developed, and is being widely encouraged. During 1887, 35,000 immigrants, mostly Italians, arrived at Santos. All have found ready employment and have settled down satisfactorily. The climate is best adapted to the Italian race, and is not suited to the agricultural classes of Great Britain. The prospects of the province are regarded as excellent.

Population of Guatemala.—According to official returns, the population of Guatemala on January 1st, 1888, was 1,394,233, as compared with 1,357,900 at the same date in 1887.

The Trade of Vera Cruz.—Consul Baker's Commercial Report for 1887 (No. 322) states generally, with regard to the trade of this State, which includes the chief port for the foreign trade of Mexico, that it has shown a marked increase, and is considerably above the average of the past eleven years; the increase being due to the continuance of peace and to the improved means of communication north of the City of Mexico. The exports (excluding precious metals) show an increase of 27 per cent. on 1886, and were distributed as follows:—

	1887.	1886.
England	£177,824	£148,234
United States	542,844	421,894
Germany	158,122	125,839
France	98,438	64,968
Spain	13,177	9,691
Other countries	56,761	51,318
	<hr/> £1,047,166	<hr/> £821,944

This increase took place chiefly in two items, viz. coffee and mineral ores. The sales in the former advanced, principally because of the rise in price, from 258,691*l.* to 407,845*l.* Mineral ores rose from 141,498*l.* in 1886 to 208,013*l.* in 1887. The increase of 27 per cent. in the total imports is, according to the report, satisfactory as showing progress, but bears no proportion to the capacity of the country for the production of articles of export, as that capacity still remains undeveloped, owing to want of adequate means of communication. The imports increased from 1,326,697*l.* in 1886 to 2,159,269*l.* in 1887. The present population of the State is 640,000, or only 30 to the square mile.

The Peruvian Geographical Society.—A Geographical Society has been formed at Lima, under the auspices of the Peruvian Government

At the first meeting, which took place at the Hall of the Senate on March 15th, 1888, a good list of original members was announced, including Don Modesto Basadre, the accomplished author of 'Riquezas Peruanas,' and himself an explorer of some note; Mr. Arthur Wertherman, whose labours on the Upper Amazon have been noticed in our 'Proceedings'; Admiral Garcia y Garcia; Mr. William Billinghamurst, who made a valuable report on Lake Aullagas; Mr. William Nation, the eminent naturalist; Dr. Leonardo Villar, the learned Quichua scholar; Don Carlos Paz Soldan, and others. A committee was nominated to frame a set of rules. Don Leonardo Pflucker was elected President, and Don Pedro Paz Soldan, the nephew of our late Honorary Corresponding Member, and himself an ardent geographer, was elected Secretary.

Obituary.

Mr. Walter Montagu Kerr.—It is with much regret that we announce the death of this ardent young African explorer at Hyères, on April 27th last. Mr. Kerr was the son of Lord Charles Lennox Kerr, and cousin of the Marquis of Lothian, and was born at Perth in 1852. He was educated at the Charterhouse School. He showed great taste for mechanics, and having learned engineering as a profession, was for some time employed on the old Tay Bridge under Sir Thomas Bouch. This he left in 1873, and went to California, where he pursued his engineering profession, and rose to be acting Chief Engineer on the Spring Valley Waterworks. Mr. Kerr went to New York in 1874, and was soon thereafter sent to survey and report on some mines in Mexico. Here his duties were arduous and dangerous, involving journeys to San Francisco and back with specie and machinery, and great risks being run from the attacks of Apache Indians. He, however, succeeded in overcoming all difficulties, and established the mines in complete working order. But his health had broken down, and after a visit to England, he settled down at New York, and soon established a good business on the Stock Exchange, winning the favour of all with whom he came into contact by his pleasant manners and sterling qualities. His health, however, again broke down, and as a visit home did not improve it, he finally sold off the business at a great loss. It was partly on account of his health that Mr. Kerr turned his attention to Africa. From the moment he entered the Dark Continent, he became an enthusiast for its exploration. In the autumn of 1883 he left England for South Africa, where he made the acquaintance of Mr. Selous. Into the details of Mr. Kerr's somewhat daring journey from the Cape through the Orange Free State, Matabele and Mashona Lands, across the Zambesi to Lake Nyassa, and down to Quillimane, we need not enter, as the journey has been so fully described in the 'Proceedings' for 1886, p. 65, and in Mr. Kerr's own interesting narrative, 'In the Far Interior.' He encountered many dangers, but succeeded in winning his way single-handed by his indomitable pluck and pleasant manners. Mr. Kerr gained much experience in the journey, which he took to heart, and had he been spared, there is no doubt he would have done work in Africa which would have brought him high credit. Apart from its general interest, his journey in South Africa added something to our knowledge of the geography of the country through which he travelled.

On Mr. Kerr's return to England his health again gave way, and he accepted an offer to go to Southern Mexico to report on a tract of country with a view to its colonisation. On his return from Mexico he conceived the idea of making his way to Khartum single-handed, from Cairo or Suakin, in order, among other things, to recover Gordon's journals. He tried strenuously to accomplish his purpose, but in reply to his telegrams to Suakin, he was informed that he would not be permitted to enter the country. Reluctantly compelled to give up the scheme, Mr. Kerr elaborated a plan for entering Africa by Zanzibar, making for Emin Pasha's station at Wadelai, and thence carrying out exploring work in whatever direction seemed most likely to yield the best results. While he received help from a friend interested in Africa, he contributed a considerable sum of money of his own. Before setting out he took pains to qualify himself in every way for making the most of his opportunities for observation. He left England in November 1887 for Zanzibar. Here Mr. Kerr organised his expedition and proceeded to Mombasa with his caravan. After two days' march into the interior, he was struck down with fever so severely that he had to be carried to the coast, where he embarked in a small Messageries boat, and after a terrible journey landed at Cairo in February. As the climate did not suit him, Mr. Kerr made his way to Marseilles and thence to Hyères. For a time he seemed to get a little better, but ere long the trials he had gone through, his despair at the failure of his expedition, and the gloomy outlook on account of his health, completely broke him down, and he died on April 27th. Mr. Montagu Kerr is deeply regretted by all with whom he came into contact; for his simplicity, enthusiasm, and noble aims could not but make a deep impression. Had he lived he would certainly have achieved a name and position as an African explorer.

Admiral C. L. C. Irminger, Danish Navy.—The eminent hydrographer, Admiral Irminger, one of our Honorary Corresponding Members, died at the advanced age of 86, on the 7th February last. He was born on the 3rd April, 1802, in Holstein, and entered the Danish navy as midshipman in 1814. As quite a young Lieutenant, in command of a schooner on the West India station, he had the good luck to capture a Colombian privateer, and some years after he was attached to the suite of Prince Fredrik, afterwards King Fredrik VII., under whose reign he was made General-aide-de-camp. He retained this post under the reign of the present king, Christian IX. As Rear-Admiral he had the honour to convey the present Empress of Russia to Kronstadt, and had several times been attached to the suite of the Prince of Wales during his Royal Highness's visits to Denmark. He retired from active service as a Vice-Admiral some years before his death.

From his earliest days Admiral Irminger took a great interest in geography and hydrography, which his many voyages afforded him good opportunity of studying practically. It was especially the hydrography of the northern part of the Atlantic which engaged his attention, and he made a long-continued series of valuable observations on the temperatures and currents of that part of the ocean. He also induced the masters of Danish vessels engaged in the Iceland and Greenland trades to collect data, which were published when a sufficient body of facts were obtained concerning the currents of certain branches of the Gulf Stream around Iceland and in the adjacent sea. The results were given in several papers contained in Danish and foreign transactions, the publication of which brought him into correspondence with many scientific men abroad in different countries. He was elected Corresponding Member of the R.G.S. in 1863, and took an active interest in the preparations for the voyage of the *Fox* in search of Sir John Franklin, under Sir Leopold M'Clintock, for which expedition he obtained the services of Carl Petersen as interpreter. When the Geographical Society of Copenhagen was founded, Admiral Irminger naturally took

a lively interest in its affairs and was nominated one of the Directors. He contributed the following papers to the Journal and Proceedings of our Society.

"The Arctic Current around Greenland." Read April 28th, 1856. Published in the 26th volume of the R.G.S. Journal. 'Proceedings,' vol. i.

"On Surface Temperatures in the North Atlantic." Published in the 40th volume of the R.G.S. Journal.

"Zeno's Frislanda is Iceland and not the Faroes." With map and diagram. Published in the 49th volume of the R.G.S. Journal.

"Currents and Ice-drifts on the Coasts of Iceland." 'Proceedings,' vol. v. June 10th, 1861.

"On the Evidences of the Gulf Stream in High Latitudes in the North Atlantic." 'Proceedings,' vol. xiii. May 10th, 1869.

Sir Charles Tilston Bright, the eminent electrician and telegraphic engineer, died on the 3rd of May. His name will be hereafter remembered as that of one of the founders of the first Atlantic telegraph. He was one of the chief promoters and engineers from the commencement, and the first cable was laid by him and his staff in July and August 1858. He was shortly afterwards knighted for his share in this great public work, and for his previous services in the improvement and extension of lines of electric telegraph along the lines of railway and in the large towns of England and Scotland. Subsequently he was engaged in furthering the extensions of the submarine telegraph to Hanover and Denmark; and the laying of cables between the mainland of Spain and the Balearic Islands. In 1860 he joined with a few others in advocating an expedition to survey a more northerly route for the laying of a second trans-Atlantic telegraph cable via Iceland, Greenland, and Newfoundland, with the view of subdividing the circuits, and thus increasing the speed of transmission and reducing the risks of loss. The Government acceded to the representations made, and despatched H.M.S. *Bulldog*, under Sir Leopold M'Clintock, the projectors themselves equipping the steam yacht *Fox*, under Captain Allen Young. An account of the surveys made by these two important expeditions was read before the Society on the 28th of January, 1861, in four papers, one by Sir Leopold M'Clintock, a second by Sir Charles Bright (founded on Captain Allen Young's Report), the third by Dr. Rae, who commanded the land party who surveyed the Færøes and Iceland, and the fourth by Colonel T. P. Shaffner, of the United States Army. The discussion on these papers was adjourned to the next following meeting, in which Lord Ashburton (the President), Admiral Sir Edward Belcher, Captain Sherard Osborn, Mr. John Ball, F.R.S., Sir Roderick Murchison, Dr. Rae, and others took part. In 1863 and 1864 Sir Charles took personal charge of the expedition for laying the cable between Kurrachee and the Persian Gulf. In 1868 he was engaged in the West Indies in the submersion of a cable between Havana and Florida, and afterwards, in 1869-72, in laying the great series of cables which connect North America and the chief islands of the West Indies with Demerara. His arduous labours during these three years, and the unhealthiness of many stations where the heavy shore ends of the 4000 miles of cable had to be laid, told severely on his health. He was elected President of the Society of Telegraph Engineers in 1882, and was the author of many papers on electrical subjects read before the British Association and other societies. He had been a Fellow of the Society since 1861.

REPORT OF THE EVENING MEETINGS, SESSION 1887-8.

Eleventh Meeting, 14th May, 1888.—General R. STRACHEY, B.E., F.R.S.,
President, in the Chair.

ELECTIONS.—*George Cawston, Esq.; Henry Edmund Charlesworth, Esq.; Edward Jones, Esq.; Richard William Murray, Esq.*

The paper read was :—

“A Journey across Central Asia, from Manchuria and Peking to Kashmir, over the Mustagh Pass.” By Lieut. F. E. Younghusband (King’s Dragoon Guards). Will be published, with map, in a subsequent No. of the ‘Proceedings.’

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris, March 2nd, 1888: Dr. HAMY in the Chair.
—The following information of geographical interest was communicated by M. Venukof:—Madame V. Golubtzov had made some interesting researches in the mountains of Tunka (Eastern Sayan), not far from Irkutsk and Lake Baikal. The geological map of the country published by M. Tchersky had already shown the existence in this region of masses of basaltic lava, but Madame Golubtzov had determined the topographical distribution, geological character, and chemical composition of the same. An extract from her report on this subject would be found in the ‘Mémoires de la Société des Naturalistes de Saint-Pétersbourg,’ which contained also some important studies on the physical geography of Russia. One of the most recent of the latter was that of M. Krasnoff on the formation of the soil at the foot of the Alatau and Thian-Shan ranges in the Province of Semirechinsk. The author had found there stretches of soil identical with that of the plains which extend to the north of the Caucasus.—Baron de Bieberstein wrote, giving some further information on the subject of the projected Trans-Siberian railway. The Russian Government had decided to commence in the spring the surveys for a line between Possolski on Lake Baikal and Sretensk, a town on the river Shilka. The length of the railway between these two points would be 745 miles. Should this and the projected line from Tomsk to Irkutsk be actually constructed, Russia in Europe would, by means of these two railways and the fluvial system of the Obi, Upper Tunguska, Shilka, Amur, and Lake Baikal, be connected without any break with the Pacific.—The Chairman then referred to the death of M. Giacomo de Brazza (brother of the celebrated explorer), who had succumbed to a malady the germs of which he had undoubtedly contracted in the course of his African journeys. The principal geographical work done by the deceased was the exploration of the vast regions extending between 2° N. lat. and 2° S. lat., in the course of which he made an important voyage of discovery along the course of the Likuala.—Comte H. de Charencey read a paper on the language of the Basque race, in which he sought to prove that the Basques must have arrived in Western Europe towards the end of the neolithic age, or about the 40th or 50th century before our era. Their language seemed to present close affinities with certain dialects of the New World. The most recent anthropological researches proved the former existence of tribes of the copper-coloured race in all the northern part of the Old Continent, whence they migrated to America across Behring Straits. The Basques might probably be regarded as the result of a mixture of the ancient peoples of Northern Europe with nations of the Caucasian type.—In conclusion, M. J. Thoulet made a communication on oceanography.

— March 16th, 1888 : Dr. HAMY in the Chair.—The Minister of Public Instruction forwarded a copy of his circular of the 5th March relative to the holding of the Twenty-sixth Congress of Learned Societies, which would take place on 22nd May and three following days. The 26th May would be devoted to the General Meeting, which would be held in the large Sorbonne Hall under the presidency of the Minister.—The President of the Anthropological Academy of New York announced that an International Anthropological Congress would be held under the auspices of that Society, from the 4th to 7th June next in the buildings of Columbia College, New York.—M. Emile Daireaux made a communication on the condition of the Argentine Republic in 1888, in the course of which he reviewed the progress made by that country during recent years.—In conclusion, the Chairman announced that at the end of the present month, or at the beginning of April, an extraordinary meeting would be held in the Sorbonne Hall for the reception of M. Caron, naval lieutenant, who was in command of the French gunboat *Niger* on its recent voyage to Timbaktu.

— April 6th, 1888 : M. de BIZEMONT, Vice-President, in the Chair.—M. J. Dupuis, writing from Hanoi on 12th February, announced his departure on a journey to Indo-China in company with a foreign traveller, Count Anrep-Elmpt, whose object was to penetrate into the interior by way of the Mekong. M. Dupuis gave some information about his companion, from which it appears that the latter, who is a Russian, has for the last thirty years travelled over different countries in all parts of the world. His present intention is to visit the little-known territory of the Muonga, Moïs, and others, and to study their origin ; after this he will proceed to Thibet.—A new expedition for the further exploration of Indo-China was announced by M. L. Delaporte. This mission had been entrusted to M. Fournereau, already known by an exploration in Guiana, who had by two years' sojourn in Indo-China prepared himself for the present journey. The party started on 15th January last, since which date no news had been received.—The following information with reference to the river Saint Joseph (New Guinea) was communicated by M. R. du Caillaud from the 'Annales de Notre-Dame du Sacre-Cœur' (April 1888). In October last, two gold-seekers, Messrs. Cameron and English, ascended the river with Père Verins. They managed to get a little further than the previous expedition of the Pères du Sacre-Cœur, viz. almost up to the first mountains. On the summits of these mountains there dwells a tribe of cannibals. The women, as well as the men, wear a belt of wrack-grass, which they call "Habouri." Above the furthest point reached, the Saint Joseph sends out an arm towards Redscar Bay. The travellers descended the river on a raft from Rarat. They had to pass three cataracts, small indeed, but quite large enough to render navigation impossible as far as Amo, a village situated a few miles above Ina-wi.—M. Antoine d'Abbadie made a communication with reference to Mount Woso or Wocho in Abyssinia. M. Hénon, a French traveller, had, he said, in the course of an excursion from the river Gabba, where he was located, to the frontier of Walamo, endeavoured in vain to find Mount Woso, the summit of which should be, according to M. d'Abbadie's map, in this neighbourhood. M. d'Abbadie, in admitting that this mountain could not have the altitude which he had assigned to it, viz. 16,590 feet, explained that his survey of the mountain was made from Falle, a place 150 miles away, whence it was difficult to be perceived, and also that he was only able to fix its position by the sun on one occasion. M. d'Abbadie was now of opinion that the mountain was probably nearer to Falle than he had supposed ; for the present it would be prudent to suppress Mount Woso on our maps.—In conclusion M. Blondel read a paper on the island of Réunion, its port and its railway. He said that the principal product cultivated was the sugar-cane. The profits attaching to

it, which were once large, were now much reduced. Several new plants had been introduced for cultivation, such as the vine, cinchona, indiarubber. One great drawback was the lack of manual labour. Immigrants from India had been introduced by arrangement with the English Government, but had not benefited the colony. The immigrants were badly chosen, and had never worked on the land; they were the scum of the towns of which the Indian Government was glad to rid itself. They had brought to Réunion the fevers which had ravaged that island formerly renowned for its salubrity.

— April 9th, 1888: M. FERDINAND DE LESSEPS, President of the Society, in the Chair.—This was a Special Meeting of the Society, held in the large hall of the Sorbonne, for the purpose of giving a reception to Lieut. J. E. Caron on his return from his voyage down the Upper Niger. Among those on the platform, the following may be mentioned:—M. Genouille, Governor of Senegal; M. Bayol, Deputy-Governor; M. F. Charmes, specially delegated to represent the Minister of Public Instruction; Dr. Hamy, and MM. de Bizemont, Duveyrier, Meurand, &c. Lieut. Caron was accompanied by his companions in travel, Lieut. Lefort and Dr. Jouenne.—In his opening remarks the Chairman said that the mission of M. Caron opened a new era in geography and in the economic development of the Sudan, it inaugurated an important phase in the accomplishment of the work conceived by Colonel Faidherbe, when he was Governor of Senegal. The governors who had succeeded the latter had taken up his work and had added new discoveries. The missions of Lieuts. Lambert and Pascal, and of Lieut. Mage and Dr. Quintin, and then of Captain Gallieni, had little by little enlarged the area of our knowledge of this region. In 1886 Lieut. Davoust had conducted a gun-boat along the Niger for a considerable distance in the direction of Timbuktu, but it had been reserved for M. Caron to achieve the long-coveted distinction of navigating the Niger up to that town. The Chairman also recalled the fact that it was almost exactly seven years ago that the Society in that same hall welcomed Dr. Lenz on his return from Timbuktu.—Lieut. Caron, who was much applauded, then gave an account of his voyage down the Upper Niger from Bammako to Korioume, the port of Timbuktu.*

Geographical Society of Berlin.—Extraordinary Meeting held on the 21st April to celebrate the sixtieth anniversary of the Society. The Chairman, Baron von Richthofen, reviewed the operations of the Society during the last five years, and then announced that Herren Hann, Wojeikoff, Powell, Quatrefages, Whitney and Suess had been admitted as honorary members of the Society. He also presented to Dr. W. Junker, the Karl Ritter medal. The latter then delivered a lecture upon the peoples inhabiting the country between the Kibalé-Welle and the Nepoko, and also made some observations upon Stanley's expedition to the relief of Emin Pasha. In Central Africa an almost perpetual state of warfare prevails. The abduction of a woman is often sufficient to engender strife: consequently the abodes of the Central African tribes, and their political conditions, are subject to continual and incessant changes. If a conquered tribe will not surrender its territory, it falls into a condition of bondage to the victorious race. The peasant class of the population of these regions is either the remnant of an aboriginal people, or of a tribe which has been conquered in another part of the country, and has emigrated and then entered voluntarily into conditions of servitude, or it has been compelled by the victors to settle at a particular place. Such are the conditions under which the peasants live; they do not, however, mix with the lords of the soil, but dwell in separate and compact colonies. It cannot

* 'R.G.S. Proc.,' 1888, p. 164.

therefore be said that one district is wholly occupied by one race. The population is in every case very mixed and composed of the most diverse elements. The "Rape of the Sabine Women" is the principal cause of the feuds, and of the uncommon mixture of races. Great empires in this part of Africa are only held together by despotism. It was successful policy on the part of the Arab traders to destroy these large empires and to put their creatures in the place of the dynasties expelled. King Munsa, of Mangbattu, fell a victim to this policy. The only voluntary nomads of these regions are the Akka or Tiki-tiki. They construct their little cone-shaped grass huts in the shelter of the trees of the woods, and live in a district as long as the chase lasts. In the selection of their temporary settlements, they show a preference for one tribe and aversion to another, whose territory they avoid. Generally speaking they are not only tolerated by the rulers but their presence is welcomed, and being practised archers and cunning warriors, they are employed in the invasions of the territory of neighbouring tribes. They possess absolutely no industry, and buy even their arrow-heads in exchange for meat, the produce of the chase. Timid and suspicious, Junker was only once successful in seeing a band of about 150 of them together. They cannot properly be described as dwarfs, but only as relatively very small men. In Mabode and Mamfu they are also called Woshua.—The south-eastern part of this region forms the scene of the movements of the Stanley expedition. The last news of Stanley was from the country of Mabode. His intention was to leave the Aruwimi-Nepoko, in consequence of navigation along that river being arrested by the falls. From that region only two routes, speaking generally, lay open to him, by means of which he could reach Emin Pasha. He could either strike across due east from the Nepoko to the southern shores of Albert Nyanza, through a completely unknown country, or march in a north-easterly and east-north-easterly direction to Wadelai. In the case of the latter route, the experiences of Dr. Junker and information with which the latter had furnished him at their meeting in Cairo and Suez would stand him in good stead. This route is longer, but it would conduct him through an already known region which had been explored by Junker. Losses of time could not be avoided in the case of such a large expedition as that of Stanley. The natives, however, little prepared for war, and subdivided into small clans, would offer no resistance to the expedition; they would probably leave house and home, and flee away into the woods before the approaching column. There would be no time for palavers, the expedition would have to be fed and for this purpose forced requisitions would have to be made, even with the best and most honourable intentions, since there are no other means of feeding the people. On the Middle Nepoko the food supply is a difficulty; cattle are not to be had, although goats are. Further to the east it is easier to get supplies. Along such a route, where food has been obtained by forcible means, it would be impossible to send back news to the Congo even with twenty or thirty men. The messengers would be annihilated by the natives. Therefore, no tidings from Stanley are to be expected from the Congo. If Stanley has taken the north-eastern route to Wadelai, he has arrived from the country of Mabode into that of Mamfu. In these more elevated regions there is a plentiful corn and meat supply. The extensive corn-fields remind the traveller of Europe. It is an open and unobstructive country; from this region the Arab dealers carried off 6000 head of cattle on one expedition alone. The tracts which are trodden out by herds of cattle, render marching easier, and it is a land eminently fitted to support a large expedition, especially the rich and fertile regions of Kalika and Lubari. Dr. Junker's conviction is that Stanley has attained his object, and that soon news from him will arrive by way of Zanzibar.

— May 5th, 1888: Baron von RICHTHOFEN in the Chair.—Dr. B. Moritz gave an address on the geography and ethnography of South Mesopotamia. He

pointed out that this region, although comparatively near to Europe, and full of importance as regards the history of civilisation, is still relatively little known. He visited the country as a member of an archæological expedition in the winter of 1886-7. The aspect of the country is wretched. Extensive desert plains with few permanent settlements, inhabited by a semi-savage population, this is the impression which one receives of ancient Babylonia, the Irâk of to-day; and it is difficult to picture in imagination these deserts as lands once intersected by navigable canals, and covered with luxuriant fields and numerous cities, in which commerce, industry, arts, and science flourished. Islam, the enemy of civilisation, has been guilty of the ruin of this country. The Arabs of the desert, after having plundered the land, did not concern themselves to keep in a state of preservation the canals and dams on which the existence of the country depends. This fact and the endless civil wars, together with the system of robbery pursued by the Mohammedan governments, completed the ruin of the country in a few centuries. With the diminishing population the water-works fell into decay, and the land was transformed into a swamp, or parched up to a desert waste. Even in the thirteenth century the country presented the same aspect as it does to-day, and injustice has been done to the Turks in ascribing its decay to them. At the present time the desert comprises two-thirds of the whole region, and this desert forms a level unbroken plain with little or no vegetation; only in the depressions, where rain-water collects or the inundations penetrate, is there any grass and undergrowth to be seen. In the vicinity of the great fields of ruins the strongly saline composition of the soil prevents every kind of vegetation. From these plains, often as level as a table, rise numerous piles of ruins and débris as witnesses of earlier civilisation; these ruins are known among the inhabitants by the characteristic name of "nis-chân," i.e. "signs" or "objects of direction." While some of these piles only rise a few yards above the soil of the desert, the remains of former large cities mount up to a height of 100 feet, and possess a diameter of several miles. In many cases walls and buildings still tower aloft; in some more recent ruins one can still trace complete lines of streets. Besides these piles of ruins the dams of ancient canals are worthy of notice. These, in some cases, reach a height of 50 feet. A striking feature in the whole of Mesopotamia is the murkiness of the atmosphere, in sharp contrast with its transparency in the neighbouring Syrian desert. The highest hills can scarcely be discerned at a distance of ten miles. This density is equally great in summer and in winter. The frequent storms of dust are another peculiarity. The material for these storms is furnished by the old crumbled walls of brick which have been continually disintegrated by the high degree of heat. The dust, raised by the wind in clouds, fills the air at times to such an extent that the sun remains completely obscured, and by degrees it changes the appearance of the country. Ancient canals of importance are already blocked up by the dust, and the dunes of the same material, which have accumulated here and there in long parallel lines, threaten on the Tigris to cover up the few existing fields. While one part of the country has been withdrawn from cultivation owing to lack of water, other parts have shared a similar fate in consequence of a superabundance of water. At the present time, and when the waters are at a normal level, the swamps comprise one-third of the country. The latter have, it is true, already existed for 3000 years, although to a smaller extent, when Babylonia was still a regularly cultivated land, as the reliefs of the Assyrian palaces prove. The Greeks possessed considerable knowledge of marshes of the Euphrates west of Babylon, the Lake Negef of to-day. Alexander the Great attempted to stop up the canal through which the Euphrates flows into the lake, but he was as little successful as Turkey has been in the present century; so that in the year 1886 the whole volume of the waters of the

Euphrates flowed away into this swamp, and the town of Hille had to be abandoned by its inhabitants on account of lack of water. To the Romans also these swamps were known under the name of the "Lacus Chaldaicus." They were formed by the high waters and consequent overflowings of the Euphrates and Tigris. The waters of the rivers do not commence to rise simultaneously. The Tigris, with its greater fall and shorter course, begins to rise at Bagdad towards the end of February, and at the commencement of March to fill up the canals and swamps. The high water of the Euphrates, which has to travel over 1740 miles, arrives here a month later, viz. at the beginning of April. The floods penetrate many miles into the desert so that it is possible at times to travel in a boat or small steamer from Shatra on the Shatt-el-hai direct to Gurna on the Tigris. At the end of April, when half Babylonia lies under water, the waters begin to cease rising. With the increasing heat, which reaches its highest point in May, and with the strong westerly winds which generally commence then, the waters soon subside. In August the Shatt-el-hai, which is 160 yards broad at Shatra, is almost completely dried up, so that the inhabitants of the latter town are compelled to dig wells in the dry river-bed. In September the whole country is parched. In spite of the great quantity of decaying matter left behind by the subsidence of the waters, the climate is healthy throughout the whole year in consequence of the strong west winds, with the exception of most of the towns on the Euphrates, and is not one great fever haunt, as might well have been supposed. The marshes are covered with clumps of reeds and rushes, growing to a height of about 3 feet, through which run channels both narrow and broad, and in this maze of channels the stranger without a guide is lost. They are enlivened by numerous water fowl and large herds of wild boars. The maneless lion is also numerous. Travelling in such a country is difficult; the best time for the same is the winter. At this time of the year travelling is best performed on horseback. When the floods are abroad, it is only possible to travel in the boats used by the natives, which are most primitive. The inhabitants of the country bear little resemblance to the Bedouins of the deserts, the pure Arabs; they are of a tall and powerful build. Their clothing is the common Arab style—a red or blue handkerchief for the head, a many-coloured "kaftan," and a dark cloak. Only wealthy people can afford the luxury of a padded coat in the winter, which here also commences with frost. The population may be subdivided into three classes. The inhabitants of the deserts, the Bedouins, live mostly west of the Shatt-el-hai. Their dwellings are tents made of black goat's hair; they possess wonderfully large herds of sheep and camels, and moreover pursue cattle-lifting as a national sport. The second class are the dwellers along the rivers and canals. They form the settled agricultural element, and are, although enjoying the smallest area of the country, the most numerous class of the population. Their common name is Mādān (plural, Mēdi). They are subdivided into a number of small tribes which have no connection with each other. They live in reed huts, which are a cross between the tent of the nomads and the permanent house. For although farmers, they are not in the strictest sense of the word settled. At the time of great inundations they frequently leave their abodes and seek other places of residence, where the conditions as regards the waters are more favourable. Many also proceed in the summer into the desert, and only return in the winter to attend to their fields. Rice, barley, and wheat are cultivated; the quantity is just sufficient for home consumption. There is hardly any export. Rotten fish form also a chief article of food. The third class of the population are the inhabitants of the marshes, whose sole employment is the pasturing of their buffaloes. They are human amphibia, who, like their cattle, subsist on the lower parts of the reeds and rushes, and as a rule wear only a felt cap, stiff with dirt, on their heads; they are otherwise generally unclothed.

They live in little rush-huts which are frequently situated in an indescribable morass. Their civilisation is an incredibly low one.—Dr. Walther then made some observations upon the results of his journey of geological exploration in the Sinai peninsula and the Arabian desert. On the western coast of the peninsula the formation and thickness of the coral-reefs were studied by the traveller, and the petrified coral-reefs on the southern point of the peninsula, at Djebel Harman Musa, were explored; the latter cover the whole of this mountain high above the present shore-line and exhibit a strong dolomitic lime, which, with its contents of 10 per cent. of magnesia, puts one almost in mind of Zechstein-dolomite. Dr. Walther believes that he has discovered a great depression of the sea-level, and not an elevation of the land, which, if it continues, will gradually cause a desiccation of the entire gulf. He has further studied in these regions the problems of the desert-formation, and according to the result of his explorations he is opposed to Frass and Zittel, who hold the theory that the surface-configuration of the deserts has been caused by other meteorological forces than those which are to-day in operation. According to Dr. Walther, no change of climatic factors has occurred. The formation of the desert sand is still going on to-day as it did thousands of years ago; it is produced by the differences of temperature (from 50° to 80°) to which the rock is daily exposed; the action is very different in the case of monochromatic and polychromatic rocks. The rocks are first of all, by the change of temperature, broken into pieces, which by the action of the existing and also of the wind-carried sand, are polished and have the appearance of having been varnished; these are the granite deserts. The polychromatic rocks like granite, disintegrate in consequence of the different specific heat of their constituent parts into sand; but felspar is never, as with us, disintegrated and dull, but is solid and shining. Granite and similar rocks constitute, therefore, the most perishable rocks in the desert. In the case of granite blocks, which lie half buried in the sand, only the upper and projecting parts become disintegrated. The wind, then, in consequence of the different weight of felspar, quartz, and mica, separates the granite sand into its different component parts, and therefore one frequently sees on the lee side of dunes, which are composed of granite sand, rich accumulations of scales of mica, while the heavier quartz grains remain behind on the weather side.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

Bernegg, Hektor Sprecher v.—Die Verteilung der bodenständigen Bevölkerung im Rheinischen Deutschland im Jahre 1820. Ein Beitrag zur Methodik der Dichtigkeitskarten und zur Anthropogeographie des südwestlichen und westlichen Deutschland. Güttingen, 1887: 8vo, pp. iv. and 98, map.

Geikie, Archibald.—An Elementary Geography of the British Isles. London, Macmillan & Co., 1888: 8vo., pp. vi. and 127. Price 1s. [Presented by the Publishers.]

This little manual is based on the method laid down by Mr. Geikie in his 'Teaching of Geography,' and the method is carried out as far as practicable within the limits. About twenty-six pages are devoted to a general introduction, dealing with the physical geography, population, products, industries, commerce, and internal communications. Each division—England, Scotland, and Ireland—is treated after the same manner, but in more detail, each county having a brief paragraph to itself, somewhat after the manner of Green's 'Short

Geography of the British Islands.' The text-book is a great advance on anything of the kind in English, though Mr. Geikie need not have troubled the poor pupil with statistics down to the last unit; the population statistics are of course all wrong at this date, therefore round numbers would have been much safer.

Maurilaun, Fritz [Ritter] Kerner [V.]—*Untersuchungen über die Schneegrenze im Gebiete des Mittleren Innthales.* Wien, Tempsky, 1887: 4to., pp. 62.

This Memoir, contributed to the Vienna Academy of Sciences, brings together sixteen years' observation on the variations of the snow-limit in the Inn Valley for each day and each month of the year; a comparison being made between these data and those relating to other mountainous districts. In the discussion of the data, the author takes into account temperature, slope, and other conditions likely to affect the snow-limit.

ASIA.

Binder, Henry.—*Au Kurdistan en Mésopotamie et en Perse (Mission Scientifique du Ministère l'Instruction publique).* Paris, Quantin, 1887: imp. 8vo., pp. 453. Price 20s. (*Dulaud.*)

M. Binder is careful to give the daily dates of his diary, but omits the year in which his journey was made; we conclude from internal evidence it must have been in the last half of 1885. The journey extended over a large part of Kurdistan, Armenia, Smyrna, Mesopotamia, and Western Persia. M. Binder's observations are a distinct addition to our knowledge of these countries. The beautifully executed illustrations add greatly to the value of the volume, which also contains a good map on the scale of 1:4,000,000.

Bonnetain, Paul.—*L'Extrême Orient.* Paris, Quantin [1888]: 4to., pp. 613. Price 25s. (*Dulaud.*)

This richly illustrated volume contains a series of pictures, partly of the author's own observations, of the various countries included in the term "the East." It describes the voyage from Marseilles to Singapore, and then deals in detail with Indo-China, the Chinese Empire and Japan. It is a useful summary of our knowledge of these regions.

Central Asia.—No. 2 (1887). Further Correspondence respecting the Affairs of Central Asia. London, Harrison & Sons, folio, pp. ix. and 378, maps. Price 5s. 10d.

— No. 1 (1888). Further Correspondence respecting the Affairs of Central Asia. [In continuation of "Central Asia No. 2, 1887."] London, Harrison & Sons: folio, pp. 22, map. Price 1s. 3½d.

'Correspondence' No. 2 (1887) includes a Report on Survey Operations in Western and North-western Afghanistan in 1884, 1885, and 1886, by Major T. Holdich, R.E.

Cotteau, Edmond.—*Voyage au Caucase et en Transcaspienne, 24 juillet-11 octobre 1887.* Paris, 1888: 8vo., pp. 47, map and illustrations. [Presented by the Author.]

Ortroy, F. Van.—*Esquisse géographique de l'Afghanistan.* Extrait de la 'Revue des Questions Scientifiques,' 1887-1888. Bruxelles, Imp. Polleunis, Ceuterick et Lefébure, 1888: 8vo., pp. 151. [Presented by the Author.]

Siam.—No. 1 (1888). Report by Mr. C. E. W. Stringer of a Journey to the Laos State of Nān, Siam. London, Harrison & Sons, folio, pp. 9, map. Price 1s. 1½d.

AFRICA.

Baumann, [Dr.] Oscar.—Eine Afrikanische Tropen-Insel. Fernando Póo und die Bube. Wien, Hölzel, 1888: 8vo., pp. ix. and 150. [Presented by the Author.]

Dr. Daumann stayed some time in Fernando Po on his return from the Congo, and this monograph contains the results of his investigations, combined with those of other observers. It gives a narrative of his travels on the island, and the results thus obtained; detailed observations on the very curious people, the Bubis, who inhabit the higher parts of the island; on the fauna and flora and geology; and on the history and economical condition of the island. There is a useful bibliographical appendix, numerous illustrations, and an excellent map on the scale of 1:200,000. A summary of Dr. Baumann's observations on the physical features of the island will be found in the 'Proceedings,' 1887, p. 623.

Cowen, Charles.—Witwatersrand, Johannesburg, and other Gold Fields. Johannesburg, Transvaal, C. Cowen & Co. [1887]: 12mo., pp. 27.

Theal, George McCall.—History of South Africa [1486–1691]. With four charts. London, Swan Sonnenschein & Co., 1888: 8vo., pp. xix. and 430. Price 15s. [Presented by the Publishers.]

This is the commencement of a complete history of events in South Africa as far back as they can be traced. The present volume, embracing the period 1486–1691, contains an account of the origin of the European power in South Africa, of the condition of the native races when white men first came in contact with them, and of the nature of the intercourse between the Europeans and the natives during a period of forty years. The information has been compiled from various official documents and other authentic sources, a statement of which is given at the end of the work. The next volume is designed to embrace the remaining period of the Dutch East India Company's rule in South Africa.

AMERICA.

[Alaska.]—Report of an Expedition to the Copper, Tananá, and Kóyukuk Rivers in the Territory of Alaska in the year 1885, made under the direction of General Nelson A. Miles, Commanding the Department of the Columbia, by Lieutenant Henry T. Allen, Second U.S. Cavalry. Washington, 1887: 8vo., pp. 172, 5 maps. [Presented by Lieutenant Allen.]

The object of the expedition under Lieutenant Allen was to obtain all information that would be valuable and important, especially to the military branch of the Government. The expedition spent five months in carrying out its work, March to August 1885, and the result is a substantial addition to our knowledge of Alaska. The three rivers visited by Lieutenant Allen were practically unexplored before. The Copper river, which enters the Pacific to the south of Mount Wrangel, was only known from Russian records and native reports. The present expedition traced it up to near its source, including its eastern tributary, the Chittystone river. The whole country along its course is extremely mountainous; and as in its upper course it bends west and then east, it includes in its sweep several mountains which must be reckoned among the highest peaks of North America. Lieutenant Allen took the bearings and altitudes of them as carefully as possible under the unfavourable circumstances and great hardships he experienced, and the measurements he gives may be taken as approximately correct. Mount Wrangel, lying almost in 145° W. long., he gives as 17,500 feet. To the west of this are three peaks, Mount Tillman, 16,600 feet; Mount Drum, 13,000 feet, and Mount Sanford, 12,500 feet. To the south is Mount Blackburn, 12,500 feet. In the sketches which Lieutenant Allen gives of Mount Wrangel, he makes smoke issue from its summit, and states that during his stay in Copper River Valley it was continually sending up a light vapour. He also informs us that during a great part of the winter 1884–5, according to the only eye-witness other than natives, John Bremner, it emitted grand volumes of smoke and fire. Bremner "claims that

the fire shot above the crater a distance that appeared three times greater than the height of the mountain." Whether all the prominent peaks in this vicinity possess extinct craters could not be ascertained, though Mount Drum readily showed that it was an extinct volcano. North of the Yukon, to the Arctic, Lieutenant Allen states, the ranges are comparatively low; and he is disposed to think that no volcanic activity has ever been witnessed in Alaska in a higher latitude than Mount Wrangel, $62^{\circ} 25'$.

From the Copper river the expedition crossed without difficulty the low mountains which separate it from the Tananá. The high mountains to the east and south of this Lieutenant Allen regards as the apex of the mountain system south of the Yukon, and from which spurs shoot in all directions. The two rivers, rising very near each other, differ greatly in character. Though the Copper river is wide and broken up in places into many channels, there was no difficulty in navigating it upwards with a boat. The Tananá, again, in its course north-westwards to the Yukon, has many bends, and is greatly broken up by islands and rapids. On both rivers, and throughout the expedition, the native villages were far apart and thinly populated, the people, as a rule, being very wretched. The Tananá was followed down to its mouth in the Yukon, and, after a short stay at the settlement of Nuklúkyet, the expedition started northwards, partly overland, to the upper waters of the Kóyukuk river, another tributary of the Yukon, coming from the north-east. The so-called Yukon mountains, which had to be crossed, Lieutenant Allen found to be nowhere higher than 2000 to 2500 feet. Both here, and on the south side of the Yukon, small lakes were exceedingly numerous. The highest point reached was $67^{\circ} 10'$ N. lat., and $150^{\circ} 30'$ W. long., and here both the Kóyukuk and its tributaries had an abundant supply of water. The river was descended to its mouth in the Yukon, and the coast was reached in August. Lieutenant Allen's narrative abounds with valuable notes on the country and people, and his large scale maps are an important addition to the cartography of Alaska. The drainage basin of the Copper river he estimates at 25,000 square miles, of the Tananá 45,000, and of the Kóyukuk 55,000. One section of this report deals with the maps, and gives tables of distances; another treats of the natives; while the concluding sections are devoted to zoology, geology, volcanic action, and meteorology. There are numerous illustrations of the geographical features and of the natives.

[Guatemala.]—Informe de la Direccion General de Estadistica, 1887. Guatemala, Tip. "La Union," 8vo., pp. 300.

Hautreux (—).—Formation des bancs de Terre-Neuve, d'après M. J. Thoulet. Bull. Soc. Géogr. Commerç. Bordeaux, 16 Avril, 1888. No. 8. Pp. 241–242, 8vo.

Lindley, Walter, and Widney, J. P.—California of the South. New York, D. Appleton & Co., 1888: cr. 8vo., pp. viii. and 377, maps and illustrations. Price 8s. 6d. [Presented by the Publishers.]

In this little volume Southern California is treated of under a variety of aspects, including its physical geography, climate, resources, routes of travel, and health-resorts. It is divided into three parts. Part I. deals with the climatology of the Pacific coast, by J. P. Widney, A.M., M.D., including the seasons, topographical and climatic features, rainfall, winds, temperature, agriculture, commercial development, education, diseases, &c. In Part II. Dr. Lindley gives a description of Los Angeles, San Diego, San Bernardino, Ventura, and Santa Barbara counties. Part III. consists of a series of four articles, as follows:—Comparative valuation of lands and products, by General Nelson A. Miles; trees, shrubs, and wild flowers of Southern California, by Mrs. Jeanne C. Carr; petroleum and asphaltum in Southern California, by D. M. Berry; orange culture in Southern California, by William A. Spaulding. The Appendix includes—The public schools of Southern California, by Hon. J. R. Brierly; profits and methods of fruit-raising, by Milton Thomas; ten acres enough to support a family, by D. Edson Smith; railway tables; rates to California.

St. Bris, Thomas [De].—Discovery of the Name of America. New York, 1888 : 8vo., pp. 140. [Presented by the Author.]

The following extract will afford an idea of the character and value of Mr. De St. Bris's investigations:—"The most illustrious national name of America was sacred to her people, written in their pictorial writings by a snake crossing a straight line and called *Amaru*—the Great Sun—which began to mean anything sacred at a later period; and when an American went nearer to any of the temples than the law permitted, the police said '*Amarac*,' stop, don't do that, for these were the temples of their king, who was also the spiritual chief; and this was the name—given to the southern continent—which first appeared in 1541, on the map of Gérard Mercator [*sic*], a subject of Charles V., by whom he was employed to make charts, and a pupil of Frisius, whom he consulted." Mr. St. Bris seems to be quite serious, as serious as Mr. Ignatius Donnelly, the discoverer of the Shakespearian Bacon.

Wears, William Greville.—The Prospects of Gold Mining in Venezuela, and a Guide to the Guayana Gold Fields. Revised edition. London, W. Wilfrid Head & Mark, 1888 : 8vo., pp. 69, plan.

AUSTRALASIA.

Coghlan, T. A.—The Wealth and Progress of New South Wales, 1886-87. Sydney, Melbourne, and London, George Robertson & Co., 1887 : 8vo., pp. xviii. and 577, map. Price 10s. 6d. [Presented by the Author.]

This work is designed to "trace the progress of the colony during the first century of its history." It contains a deal of useful matter relating to New South Wales, including a sketch of the early history of the colony; its limits and area; physical configuration; climate; geological formation; mines and minerals; vegetation; fauna; population and vital statistics; land and agriculture; commerce and shipping; stock; internal communication; finance and public wealth; instruction, science, and religion; employment and social condition; law and crime; constitution and government. The appendix consists of a series of tables, showing the points of chief interest in connection with the various Australasian colonies. There is besides a "Statistical View of the progress of the Colony of New South Wales from the separation of Queensland in 1859 to the year 1886."

GENERAL.

Chisholm, George G.—Longman's Junior School Geography. London, Longman & Co., 1888 : small 4to., pp. 99.

This text-book is based on the idea that a large part, if not the chief part, of a junior course of geography consists of what can be properly learned only from maps. There are therefore thirty-one maps in the volume. One set has been prepared chiefly to serve as copies for the pupils to draw from, and therefore the outlines have been generalised and the features given are few. The other set of maps are intended merely to show density of population and productions. There are also several illustrations. Mr. Chisholm seems to us to have selected his facts with discrimination, and in the hands of a good teacher—an indispensable condition—the text-book ought to be really serviceable.

[Physical Geography.]—Appleton's American Standard Geographies, based on the principles of the Science of Education. Physical Geography, prepared on a new and original plan by John D. Quackenbos, A.M., M.D.; John S. Newberry, M.D., LL.D.; Charles H. Hitchcock, Ph.D.; W. Le Conte Stevens, Ph.D.; Henry Gannett; W. H. Dall; C. Hart Merriam, M.D.; Nathaniel L. Britton, F.M., Ph.D.; George F. Kunz; Lieut. George M. Stoney. Illustrated with engravings, diagrams, and maps in colour, and including a separate chapter on the geological history and the physical features of the United States. New York, Appleton & Co. [1887] : 4to, pp. 140. [Presented by G. Philip & Son, the London Agents.]

This is a good summary of the facts of physical geography; and as the names on the title-page will be recognised as those of some of the most eminent specialists in the States, the text-book may be accepted as trustworthy through-

out. There is, however, a want of system in the book, which has the aspect more of a series of monographs than a connected treatise. There is no division into chapters, and no table of contents. The first part deals with general notices of terrestrial physics and with geology. Then a few of the features of the continents are referred to. Then come sections on such subjects as oceanic islands, volcanoes, earthquakes, rivers, lakes, and ocean-waters, the last being specially full and good. After these there are sections on the atmosphere and all its phenomena, on plant life, animal life, the human family, mineral products and their distribution; and lastly a long section on the geology and physical geography of the United States by Professor Newberry. Thus it will be seen the text-book deals with important subjects, and it contains much good information well put. There are many diagrammatic coloured maps, besides relief maps to show the physical features. The book abounds with excellent illustrations, and would be really useful in the hands of a teacher, or of a pupil who would know how to use it for reference.

Rousdon Observatory, Devon.—Volume IV. Meteorological Observations for the Year 1887, made under the superintendence of Cuthbert E. Peek, M.A., F.R. MET. SOC., F.R.A.S. London, printed by Sir J. Causton & Sons, 1888: 4to., pp. 19. [Presented by Mr. Peek.]

Sieger, [Dr.] Robert.—Gletscher- und Seespiegelschwankungen. Separat-Abdruck aus den 'Mittheilungen des D. u. Ö. A.-V.' 1888: 12mo., pp. 12. [Presented by the Author.]

Stallibrass, E.—On Deep-Sea Sounding in connection with Submarine Telegraphy. Paper read before the Society of Telegraph Engineers and Electricians, November 10th, 1887. 8vo., pp. 34. [Presented by the Author.]

In this paper the author touched very briefly on some portion of the history of deep-sea sounding, and mentioned a few of the chief surveys which have been carried out; he afterwards explained the method in which soundings were formerly taken, and that now adopted on a thoroughly equipped expedition. The paper is illustrated with profiles, maps, &c.

Stauber, [Dr.] Anton.—Das Studium der Geographie in und ausser der Schule. Augsburg, Reichel, 1888: 8vo., pp. xiv. and 170. [Presented by the Author.]

This is the essay which gained the prize of 25,000 francs offered by the King of the Belgians for the best work on the means to be employed for the popularisation of the study of geography, and for its development in educational establishments of all kinds. In his introductory chapter Dr. Stauber insists on the essentially human aspect of geography, as developed by Ritter and Peschel. The essay treats mainly of the best methods of teaching geography and of the apparatus which ought to be used in the various grades of schools and the various classes. The second part deals with the methods of promoting an interest in geography out of school, by means of lectures, games, societies, and governments. The work contains many hints that may be useful to teachers and others interested in the promotion of geography.

Suess, Eduard.—Das Antlitz der Erde. Zweiter Band. Wien, Tempsky; Leipzig, Freytag; 1888: 8vo., pp. iv. and 704. Price 25s. (*Dulau*.)

The first volume of this important work was noticed in the 'Proceedings,' 1885, p. 490. The present volume deals with the oceans. The first chapter discusses the various theories as to changes of coast-level. In the next two chapters Dr. Suess takes us all round the Atlantic and Pacific Coasts, discussing their various features and the islands which border them. In the succeeding chapter he compares the coast structure of the two great oceans. The three following chapters are devoted to a consideration of the seas of the Palæozoic, Mesozoic, and Tertiary periods. Then follow chapters on the Norwegian Coast-lines, the Temple of Serapis at Pozzuoli, the Baltic and North Seas in historical times, the Mediterranean in historical times, Northern Coast-lines, Equatorial and Southern Coast-lines. In his concluding chapter Dr. Suess gives a brief *résumé* of what has gone before, and touches on some special points. He shows how really insignificant have been the changes in the relations of oceans and continents since the earliest period of which we have record.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Deutsch - Österreichisch - Russischen ! Grenzländer. — Karte der —, in 1:1,500,000 or 20·4 geographical miles to an inch. Mit Hervorhebung der Festungen und Unterscheidung der Eisenbahnen in ein- und zweigleisige. Von C. Vogel. Gotha, Justus Perthes, 1888. Price 2s. (*Dulau.*)

Deutschen Reiches. — Karte des —, scale 1 : 100,000 or 1·3 geographical miles to an inch. Sheets : 390, Leipzig ; 391, Oschatz. Herausgegeben vom topograph. Bureau des Königl. Sächs. Generalstabes. Price 1s. 6d. each sheet. (*Dulau.*)

Donau-Panorama von Passau bis Linz. Passau, Waldbauer. Price 1s. (*Dulau.*)

Europa. — Eisenbahn-Karte des oestlichen —, mit besonderer Berücksichtigung des russischen Reiches. Scale 1 : 2,500,000 or 34·5 geographical miles to an inch. Wien. 4 sheets. Price 10s. (*Dulau.*)

Lombardia. — Carta stradale ed alpina dell' Alta —, da E. Nessi. Scale 1 : 380,000 or 5·2 geographical miles to an inch. Como, Meyer & Zeller. Price 2s. 6d. (*Dulau.*)

London and its Environs. — Philips' New Library Map of —. Scale 550 yards to an inch. G. Philip & Son, London and Liverpool. On rollers, varnished.

In some districts this map has not been brought up to date, and it needs further correction.

Oesterreich-ungarischen Armee. — Artaria's Universal-Administrativ-Karte der —, mit der Eintheilung des Reiches in die Territorial- und Ergänzungsbezirke des k. k. Heeres und der Kriegsmarine, der k. k. und k. ungarischen Landwehr und des Landsturmes. Scale 1 : 1,500,000 or 20·4 geographical miles to an inch. Mit Beilage : Uebersicht der regelmässigen Ergänzungen an Truppen, welche die bestehenden Stellungsbezirke Oesterreich-Ungarns für das stehende Heer, für die Kriegsmarine, für die Landwehr und für den Landsturm zu leisten haben. Wien, Verlag und Eigenthum von Artaria & Co., 1888. Berlin, Simon Schropp'sche Hof-Landkartenhandlung. Price 4s. 10d. (*Dulau.*)

This map shows all the military stations, and the present positions occupied by troops in the Austro-Hungarian Monarchy, and this information is further supplemented by a pamphlet containing military statistics, and particulars of the troops composing the several garrisons.

Russischen Armee. — Dislocationskarte der — (im europäischen Reichtheile) nebst Tabellarischer Übersicht der "Ordre de Bataille" und der Armeeverhältnisse im Frieden, in der Mobilisirung und im Kriege. Nach dem officiellen russischen Truppen-Verzeichnisse "Rosspissanie," bearbeitet von E. S. Scale 1 : 4,500,000 or 62·5 geographical miles to an inch. Wien, Verlag und Eigenthum von Artaria & Co., 1888. Berlin, Simon Schropp'sche Hof-Landkartenhandlung. Price 4s. 10d. (*Dulau.*)

This map shows at a glance the present positions occupied by the Russian army, and the composition of the different army corps ; it is accompanied by a table of military statistics having reference to the strength and organisation of the Russian army.

Sverige, Norge, Danmark, och Finland. — Karta öfver —. Under ledning af O. Torell, sammandragen af C. J. O. Kjellström. Scale 1 : 2,000,000 or 27 geographical miles to an inch. Stockholm, F. & G. Beijers förlag, 1888. 2 sheets. Price 6s. 6d. (*Williams & Norgate.*)

ORDNANCE SURVEY MAPS.

Publications issued during the month of April 1888.

1-inch—General Maps:—

SCOTLAND: Sheet 117, hill-shaded, 1s. 9d.

IRELAND: Sheet 159, hill-shaded, 1s.

6-inch—County Maps:—

ENGLAND AND WALES: **Anglesey**: 1 S.E., 2 S.W., 5 N.E., 11 S.W.; 1s. each. **Brecknockshire**: 7 S.E., 41 S.E.; 1s. each. **Carmarthenshire**: 24 S.E.; 1s. **Cornwall**: 32 N.W., S.W., 40 N.E., 41 N.W., 49 N.E., 56 N.W., S.W., 57 N.E., 59 N.E., S.W., 67 S.E., 70 N.W., 78 N.W., 80 N.E., S.E., 84 N.W., N.E.; 1s. each. **Devonshire**: 9 S.W., 53 S.W., S.E.; 1s. each. **Dorsetshire**: 21 N.E., S.E., 43 S.W., 44 N.E., 46 N.E.; 1s. each. **Herefordshire**: 52 S.W.; 1s. **Lincolnshire**: 23 S.W., 116 N.E., 126 N.W., S.W., S.E., 127 N.W.; 1s. each. **Pembrokeshire**: 21 N.E.; 1s. **Radnorshire**: 36 N.W.; 1s. **Somersetshire**: 58 N.W., S.W.; 1s. each. **Staffordshire**: 4 N.W.; 1s.

25-inch—Parish Maps:—

ENGLAND AND WALES: **Brecknockshire**: XIV. 11, XV. 9, 10, 11, 12, 13, 14, 15, 16, XXI. 4, 7, 11, 12, 16, XXII. 9, 10, 12, 13, 14, 15, XXXIII. 3, 4, 7, 8, XXXIV. 1, 5, 6, XXXVI. 1, 2, 3s. each. **Cambridgeshire**: III. 12, 3s.; V. 8, VII. 9, 13, 4s. each; XX. 16, 5s.; XXIX. 2, 4s.; XXXI. 19, 3s. **Cardiganshire**: II. 6, 10, 13, IX. 12, X. 2, XI. 1, 2, 5, 11, 12, 15, XII. 13, XIV. 12, 15, XV. 9, 13, 14, XLIII. 2, 3s. each. **Carmarthenshire**: X. 2, 6, 11, 13, 15, XVII. 9, 14, XVIII. 1, XXV. 5, 13, XL. 8, 12, 15, 3s. each. **Devonshire**: XII. 3, 7, 16, XIII. 10, 13, XXI. 10, LXV. 11, 16, LXXVII. 4, CXV. 10, CXII. 3, 11, 16, 3s. each. **Dorsetshire**: VI. 11, 15, 16, XVI. 5, 13, 14, 15, XIX. 8, XX. 6, 3s. each. **Herefordshire**: XXXIV. 9, 4s.; XXXIV. 14, XXXVII. 11, 15, XXXVIII. 9, 13, XXXIX. 10, 13, XL. 7, XLII. 1, XLIV. 8, 8, XLVIII. 1, 2, 3s. each. **Leicestershire**: XXVI. 12, 3s.; XXXVI. 15, 4s.; XLIII. 10, 13, 14, 3s. each. **Lincolnshire**: XIV. 9, 13, XXXVIII. 9, 10, 13, XLVI. 5, 6, XLVII. 6, LV. 5, 6, 9, 10, 11, LXIV. 2, 5, 6, 10, 12, 13, 16, LXXVIII. 16, XCIV. 1, 3, 5, 6, 7, CXL. 15, 3s. each; CXL. 16, CXLI. 7, 11, 12, 14, CXLII. 4, 7, 8, 9, 12, 13, CXLIII. 1, 5, 7, 8, CXLIII. 13, 4s. each; CXLV. 4, CXLVII. 6, 8s. each; CXLVIII. 11, 12, 4s. each; CXLVII. 15, 16, CXLVIII. 5, 10, CXLIX. 2, 9, 13, 14, 4s. each. **Merionethshire**: XLVII. 4, 6, 9, 13, XLIX. 6, 3s. each. **Montgomeryshire**: XXV. 4, 13, 3s. each. **Norfolk**: XXXI. 12, LVII. 4, 3s. each. **Area Books**: **Belauz**, **Bowthorpe**, **Buckenham**, **Burgh** **Ampton**, **Burlingham** **St. Andrew**, **Colney**, **Coltishall**, **Great Hautbois**, **Hasingham**, **Horning**, **Hoveton** **St. Peter**, **Howe**, **Instead**, **Lingwood**, **Little Melton**, **Neatishead**, 1s. each. **Northamptonshire**: XXXIX. 11, 4s. **Rutlandshire**: VI. 4, 3s. **Somersetshire**: XVI. 5, 4s.; XXXVIII. 13, 4s.; XLIX. 1, 2, 3, 6, 7, 9, 10, 11, 13, 14, LXXXIV. 11, 15, LXXXVIII. 15, XCII. 8, 3s. each. **Warwickshire**: IX. 4, XII. 13, XV. 11, 3s. each; XV. 13, 4s.; XV. 16, 3s.; XVI. 6, 4s.; XX. 16, 3s.; XXIV. 8, 4s. **Wiltshire**: LI. 8, 6s. 6d.; LXV. 16, 3s.

Town Plans—10-foot scale:—

ENGLAND AND WALES: **Bideford**, XIX. 6, 2, 3, 7, 10, 13, 14, 15; 2s. each. **Birmingham** and environs, XIII. 12, 4, 14, 16, 28; LXVIII. 14, 20, 25; 2s. each. **Brecon** (Aberhonddu), XXVII. 12, 20, 25; XXVIII. 9, 16, 22. **Cambridge**, XL. 23; XLVII. 8, 7; 3s. each. **Dartmouth**, CXXVII. 12, 20, 25; CXXVII. 16, 9, 20; CXXVIII. 9, 21; CXXVIII. 13, 1, 11, 16, 21; 2s. each.

(Stanford, Agent.)

ASIA.

Indian Government Surveys:—

Indian Atlas, Quarter Sheets: 20 S.E. [Parts of Jodhpore and Sirohee Native States, Rajputana Agency], and 22 S.E. [Parts of Districts Ahmedabad, Broach, Kaira and Panch Mahals, of Jhalawad (Kattywar) and the Native States of Baroda, Cambay, Mahi Kanta and Rewa Kanta (Bombay Presidency)]. Scale 4 miles to an inch, 1887.—Cutch Survey, 1 inch to a mile. Sheet No. 54, Part of the Great Ran and Pranthal. Season 1884–85. No. 55, Part of Cutch. Season 1884–85. No. 56, Parts of Cutch and Morvi. Season 1884–85.—Bombay Survey, 1 inch to a mile. Seasons 1882–83 and 1884–85. Sheet No. 133, Parts of the Pardi Taluka of the Surat Collectorate, of the Dahanu Taluka of the Thana Collectorate, and of Daman, Portuguese Territory. No. 239, District Satara and Kolhapur and Southern Maratha Agency.—Punjab Survey, 1 inch to a mile. Sheet No. 250. Season 1885–86, Districts Jallundur, Hoshiarpur, and Kapurthala State. No. 252, Districts Jallundur and Ludhiana. Seasons 1885–86. No. 259, District Hissar. Seasons 1867–68 and 1882–84. No. 260, District Hissar and Bickaneer State. Season 1867–68 and 1882 to 1884. No. 268 (Preliminary edition), Districts Jallundur, Hoshiarpur, and Ludhiana. Season 1885–86.—Central India and Rajputana, 1 inch to a mile. Sheet No. 400, Parts of District Jalaun and of Gwalior and Datia (Native States). Seasons 1853–55 and 1862–63.—Oudh Revenue Survey, 1 inch to a mile. Sheet No. 133, Districts Sitapur, Bahraich and Bara Banki. Seasons 1862 to 67.—North-west

Provinces Survey, 1 inch to a mile. Sheet No. 194, District Ghazipur. Season 1880-81.—Mysore Topographical Survey, 1 inch to a mile. Sheet No. 1 (second edition), Part of Shimoga District. Season 1882-83. No. 11 (second edition), Parts of District Tumkur and Shimoga. Season 1881-82. No. 18 (second edition), Part of Shimoga District. Season 1879-80. No. 19 (second edition), Part of Shimoga District. Seasons 1880-81-82. No. 20 (second edition), Parts of Kadur and Shimoga Districts. Seasons 1878-81. No. 21 (second edition), Parts of Kadur and Shimoga Districts. Seasons 1878-81. No. 22 (third edition), Part of Kadur District. Season 1879-80. No. 23 (second edition), Part of Kadur and Shimoga Districts. Season 1881-82. No. 24 (third edition), Parts of Kadur and Shimoga Districts. Season 1881-82. No. 25 (second edition), Part of Kadur District. Seasons 1879-82. No. 27 (second edition), Parts of Tumkur, Kadur, and Shimoga Districts. Season 1880-81. No. 28 (second edition), Parts of Kadur and Tumkur Districts. Season 1880-81. No. 29 (second edition), Parts of Kadur and Tumkur Districts. Season 1880-81. No. 30 (second edition), Parts of Mysore, Kadur and Tumkur Districts. Seasons 1880-81-82. No. 43, Part of District Kolar. Season 1885-86. No. 44, Part of District Kolar. Season 1885-86. No. 45, Part of District Kolar. Season 1885-86. No. 46, Parts of Districts Bangalore and Kolar. Season 1885-86. No. 47, Part of District Kolar. Season 1885-86. No. 48, Part of District Kolar. Season 1885-86. No. 50 (second edition), Parts of Kadur and Mysore Districts. Season 1879-80. No. 57 (second edition), Part of District Mysore. Seasons 1876-78. No. 65, Part of District Bangalore. Seasons 1883-86. No. 66, Part of District Kolar. Season 1885-86. No. 70, Part of District Mysore. Season 1885-86.—Lower Burma Survey, 1 mile to 1 inch. Sheet No. 180 (Preliminary edition), Districts Prome, Henzada, and Tharrawaddy. Season 1882-83. No. 184, Districts Bassein and Henzada. Seasons 1882 to 85. No. 185, Districts Bassein and Henzada. Seasons 1881 to 85. No. 186, District Bassein. Season 1881-82.—Andaman Survey, 1 inch to 2 miles. Sheet No. 5, North Andaman. Season 1885-86. No. 6, North Andaman. Season 1885-86. No. 9, South Andaman. Seasons 1883-84 to 86.—Map of the District of Shabjahanpur, 1886, 2 miles to 1 inch (2 sheets).—District Cachar, Lower Provinces, Assam, 1865-70 and 1873-74, 4 miles to 1 inch.—District Jessore, Presidency Division, Lower Provinces of Bengal. Seasons 1855-59.—District Sonthal Pergunnahs, Bagalpur Division, Lower Provinces, Bengal, 4 miles to 1 inch. Seasons 1841-67.—District Nuddea, Presidency Division, Lower Provinces, Bengal, 4 miles to 1 inch. Seasons 1849-55.—Upper Burma, Preliminary Map, 1887, 16 miles to 1 inch (third edition).

AFRICA.

Transvaal Goldfields.—Stanford's Map of the —, British Zululand, the Delagoa Bay Railway, and the Routes from Cape Colony and Natal, 1888. Scale 1:1,023,970 or 13.89 geographical miles to an inch. London, published by Edward Stanford, April 26th, 1888.

This is likely to be a useful map to all who are interested in the gold-mining industry of South Africa; it includes all the gold region, and the positions of the several districts where mining is carried on are indicated. As there is no hill shading it would have been better if the routes had been drawn in a more decided manner.

The boundaries of the New Republic are not given, neither is there anything in the map to indicate its existence.

AMERICA.

Vereinigten Staaten und von Canada.—Karte der Volksdichte der ——. Auf Grund der Ergebnisse des X. Zensus (1880) u. unter Ausschluss der Orte über 10,000 Einwohner, entworfen von Dr. R. Lüddecke. Scale 1:7,500,000 or 102·7 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1888, Tafel 8. Gotha, Justus Perthes. (*Dulau.*)

ATLASES.

Berghaus' Physikalischer Atlas. (Begründet 1836 von Heinrich Berghaus.) 75 Karten in sieben Abteilungen, enthaltend mehrere hundert Darstellungen über Geologie, Hydrographie, Meteorologie, Erdmagnetismus, Pflanzenverbreitung, Tierverbreitung und Völkerkunde. Vollständig neu bearbeitet und unter Mitwirkung von Dr. Oscar Drude, Dr. Georg Gerland, Dr. Julius Hann, Dr. G. Hartlaub und Dr. W. Marshall, Dr. Georg Neumayer, Dr. Karl v. Zittel, herausgegeben von Prof. Dr. Hermann Berghaus. Fünfzehnte Lieferung. Inhalt: Nr. 3, Thätigkeit des Erdinnern. Nr. 25, Ostindien und China. Nr. 71, Afrika um 1880. Gotha, Justus Perthes, 1888. Price 3s. (*Dulau.*)

Sheet 3 contains eight maps showing the regions of past and present volcanic action, the changes which have been made in the coast-line through this agency, also direction, distance, and speed of the earthquake waves of Samoda, December 23rd, 1854, Arica, August 13th, 1868, and Krakatoa, August 27th, 1883. The range and dates of the principal earthquakes are shown on two hemispheres. The smaller maps are particularly worthy of notice, and exhibit some of the most curious effects of volcanic action. Sheet 25 is a chart of the Eastern Archipelago and Southern China, on which the depths of the sea are shown in contours, coloured in different tints; these latter are not altogether satisfactory, as there is some difficulty in distinguishing between the shallow water and the land. Sheet 71 is an ethnographical map of Africa, on which six inset maps are given illustrative of the same subject.

Chinese Empire.—Historical Atlas of the ———, from the earliest times down to the close of the Ming Dynasty, giving in Chinese the names of the chief towns and the metropolis of each of the chief dynasties of China. A brief description in English is also printed on each map. E. L. Oxenham. Shanghai, Kelly and Walsh, Limited, Printers and Lithographers, The Bund, 1888. (*Dulau.*)

This series commences with a map of China under Yu, the founder of the Hsia dynasty, B.C. 2205 to B.C. 1818, and concludes with one of China during the Great Ming dynasty, A.D. 1368 to 1628. The lettering is in Chinese character, and a brief description in English is also printed on each map. In his preface Mr. Oxenham gives a descriptive historical sketch in which he traces the history of the names of territorial divisions; the author also points to the fact that the maps are of unequal completeness, and, that none of them are perfect. It was originally intended to have had an English counterpart of each map printed opposite the Chinese, and these were prepared, but it was found impossible to get them printed in Shanghai, and so the idea had to be given up; this is unfortunate, as the descriptions given in English on each map are exceedingly brief, and the utility of the atlas in its present form is in a great measure confined to historical students who are acquainted with the Chinese character.

Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von ———. 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Herm. Berghaus, Carl Vogel und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel) à 1 Mark 60 Pf. Nach Erscheinen der letzten Lieferung wird den Abonnenten ein vollständiges alphabetisches Verzeichnis aller im Atlas vorkommenden Namen mit Hinweis, wo dieselben auf den Karten zu

finden, zu einem mässigen Preis zur Verfügung gestellt. Zur Abnahme desselben ist kein Abonnent verpflichtet. Die Lieferungen werden in Zwischenräumen von 4 bis 6 Wochen ausgegeben. *Erste Lieferung.* Inhalt: Nr. 19, Österreich-Ungarn, Blatt 2, in 1:1,500,000 von C. Vogel. Nr. 23, Italien, Blatt 1, in 1:1,500,000 von C. Vogel. Nr. 91, Süd-Amerika, Blatt 2, in 1:7,500,000 von H. Habenicht. Gotha, Justus Perthes, 1888. Price 1s. 6d. (*Dulau.*)

It is now six years since the last edition of this well-known atlas was completed, and the enterprising proprietor has decided to bring out a new and enlarged edition, which, indeed, owing to the changes that have taken place in boundaries, the extension of colonisation, and the additional geographical information we have received in the interval from explorers, has become a necessity if Stieler's Hand Atlas is to maintain the high character for accuracy which its previous editions have so well merited.

The first improvement we notice in the present issue is that the margins of the maps are lettered and numbered in the same manner as Johnston's "Royal Atlas" in order that places may easily be found with the aid of an index which will be published with the present edition. Of the three maps now issued two are entirely new; one forms part of a four-sheet map of Italy, and the other of a map of the Austro-Hungarian Monarchy. These have been produced in the same excellent style as those of the former edition, with additions, such as the contours of ocean depths. There are to be in all twenty-three new maps, and if the two already given may be taken as specimens, they will considerably add to the value of the atlas. The sheets will not be issued in any regular order. This is however immaterial so long as the successive parts are published at regular and not too long intervals.

Volks-Atlas.—A. Hartleben's ———— enthaltend 72 Karten in Einhundert Karten-seiten mit Vollständigem Register. 1. Lieferung: Nr. 1, Zeichenerklärung für das Verständniss geographischer Karten. Nr. 8, Die Erde. Meerestiefen nach Herm. Berghaus u. A. und Meeresströmungen nach den neuesten Forschungen. Äquatorialmassstab 1:120,000,000. Nr. 39–40, Österreichische Alpenländer, Massstab 1:1,000,000. No. 99, Central-Afrika, nach Habenicht, Ravenstein, Lannoy de Bissy u. A., Massstab 1:12,000,000. Wien, Pest, Leipzig, A. Hartleben's Verlag. Price 8d. (*Dulau.*)

The first issue of this atlas contains four maps, all of which are very creditable specimens of cartography, while its price, eightpence, is astonishingly small, when the style of work and scale of the maps is considered.

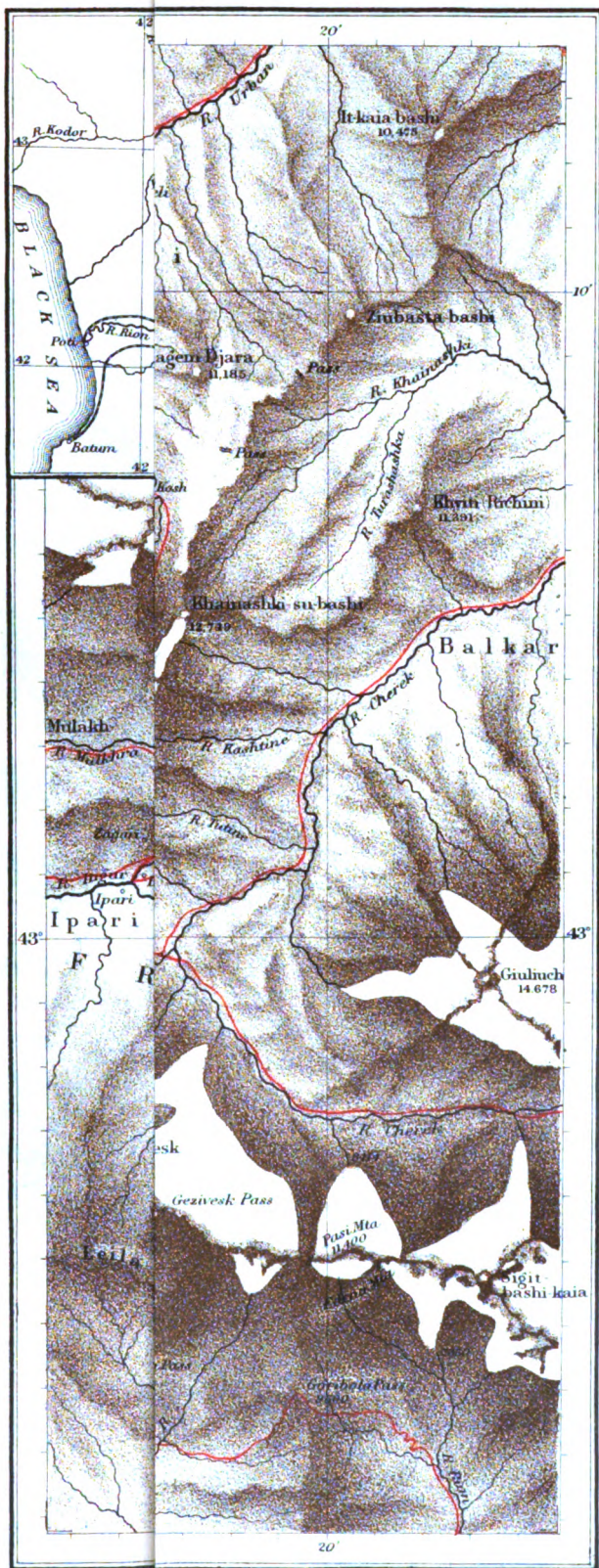
PHOTOGRAPHS.

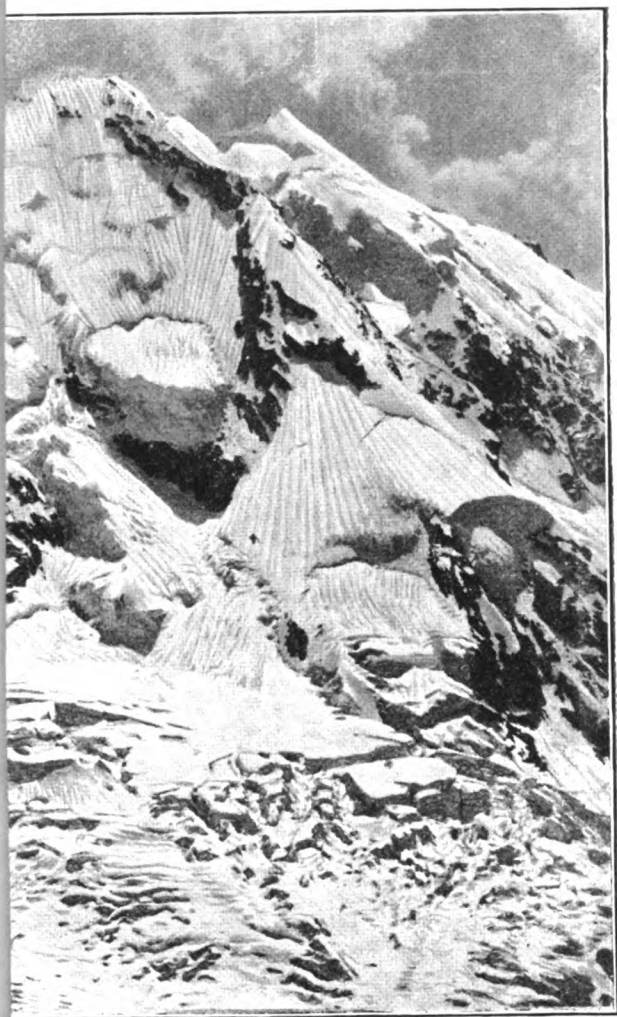
Owing to the important position which photographs now occupy in the Map-room collection, any that are received will, for the future, be acknowledged in each monthly list.

Colorado.—A series of 54 Photographs of Mountain Scenery in ———, taken by F. H. Chapin, Esq., of Hartford, Connecticut, U.S.A. (*Presented by F. H. Chapin, Esq.*)

Solomon Ids.—91 Photographs of Natives and Scenery of the ———, taken by C. M. Woodford, Esq., in 1886–87. (*Presented by C. M. Woodford, Esq.*)

Western Pacific Ids.—A series of 76 Photographs of the ——— (New Guinea, Solomon Ids., Fiji Ids., &c.), taken by Staff-Surgeon Horace E. F. Cross, R.N., of H.M.S. *Diamond*, during the past 3½ years. (*Presented by Staff-Surgeon Horace E. F. Cross, R.N.*)







ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by Colonel H. H. GODWIN-AUSTEN, F.R.S., J. K. LAUGHTON, M.A., and DOUGLAS W. FRESHFIELD, M.A. Contents: Hints on Surveying and Astronomical Observations. John Coles, F.R.A.S.—Meteorology. R. Strachan, F.M.S.—Geology. W. T. Blanford, F.R.S.—Natural History. H. W. Bates, F.R.S., Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.—Anthropology. E. B. Tylor, D.C.L., F.R.S.—Photography. W. F. Donkin, M.A.—Medical Hints. J. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department.—General Outfit. Colonel J. A. Grant, C.B., Edward Whymper, and others. Price, in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, W.; and to be had of Edward Stanford, 55, Charing Cross, S.W.

Instruction for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. Surveying and Mapping, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. Geology, including practical training in the field. By Mr. W. Topley, of the Geological Survey; President of the Geologists' Association. 3. Botany. By Mr. N. E. Brown, of the Herbarium, Kew. 4. Photography. By Mr. John Thomson, Author of *Photographic Illustrations of China and its People*, and other works.

The lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2s. 6d.

Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers, Vol. II. Part 2.—Now Ready.—CONTENTS:—A Bibliography of Algeria. By Lieut.-Colonel Sir ROBERT LAMBERT PLAYFAIR, K.C.S.I., H.M. Consul-General, Algiers.

. Fellows who have not applied for the Parts as published, can have Vol. I. complete by applying at the offices of the Society, 1, Savile Row, W.

LIMMER'S HOTEL,

CONDUIT STREET, W.

This old-established Hotel, situated in the centre of the most fashionable part of London—being mid-way between Bond Street and Regent Street—contains every convenience for the accommodation of FAMILIES and Gentlemen.

The Banqueting Hall is specially adapted for Military and other Dinners, and Wedding Breakfasts.

Address—THE PROPRIETOR.

DR. J. COLLIS BROWNE'S CHLORODYNE

ONLY GENUINE.



ORIGINAL AND

IS
THE GREAT
SPECIFIC
FOR
CHOLERA,

COUGHS,
C C COLDS,
A ASTHMA,
B BRONCHITIS.

DR. J. COLLIS BROWNE'S CHLORODYNE.—Dr. J. C. BROWNE (late Army Medical Staff) DISCOVERED a REMEDY to denote which he coined the word CHLORODYNE. Dr. Browne is the SOLE INVENTOR, and, as the composition of Chlorodyne cannot possibly be discovered by Analysis (organic substances defying elimination), and since the formula has never been published, it is evident that any statement to the effect that a compound is identical with Dr. Browne's Chlorodyne must be false.

This Caution is necessary, as many persons deceive purchasers by false representations.

DR. J. COLLIS BROWNE'S CHLORODYNE.—Vice Chancellor Sir W. PAGE WOOD stated publicly in Court that Dr. J. COLLIS BROWNE was UNDOUBTEDLY the INVENTOR of CHLORODYNE, that the whole story of the defendant Freeman was deliberately untrue, and he regretted to say it had been sworn to.—See *The Times*, July 13th, 1864.

DIARRHŒA, DYSENTERY.
GENERAL BOARD OF HEALTH, London, REPORT that it ACTS as a CHARM, one dose generally sufficient.
Dr. GIBBON, Army Medical Staff, Calcutta, states: "2 DOSES COMPLETELY CURED ME OF DIARRHŒA."

From SYMES & Co., Pharmaceutical Chemists, Simla. Jan. 5, 1880.
To J. T. DAVENPORT, London.

DEAR SIR,—We congratulate you upon the widespread reputation this justly-esteemed medicine has earned for itself all over the East. As a remedy of general utility, we much question whether a better is imported, and we shall be glad to hear of its finding a place in every Anglo-Indian home. The other brands, we are happy to say, are now relegated to the native bazaars, and, judging from their sale, we fancy their sojourn there will be but evanescent. We could multiply instances *ad infinitum* of the extraordinary efficacy of **DR. COLLIS BROWNE'S CHLORODYNE** in Diarrhœa and Dysentery, Spasms, Cramps, Neuralgia, the Vomiting of Pregnancy, and as a general sedative, that have occurred under our personal observation during many years. In Choleraic Diarrhœa, and even in the more terrible forms of Cholera itself, we have witnessed its surprisingly controlling power.

We have never used any other form of this medicine than Collis Browne's, from a firm conviction that it is decidedly the best, and also from a sense of duty we owe to the profession and the public, as we are of opinion that the substitution of any other than Collis Browne's is a deliberate breach of faith on the part of the chemist to prescribe and patient alike.—We are, Sir, faithfully yours, SYMES & CO., Members of the Pharm. Society of Great Britain, His Excellency the Viceroy's Chemists.

DR. J. COLLIS BROWNE'S CHLORODYNE is the TRUE PALLIATIVE in NEURALGIA, GOUT, CANCER, TOOTHACHE, RHEUMATISM.

DR. J. COLLIS BROWNE'S CHLORODYNE is a liquid medicine which assuages PAIN of EVERY KIND, affords a calm, refreshing sleep WITHOUT HEADACHE, and INVIGORATES the nervous system when exhausted.

DR. J. COLLIS BROWNE'S CHLORODYNE rapidly cuts short all attacks of EPILEPSY, SPASMS, COLIC, PALPITATION, HYSTERIA.

IMPORTANT CAUTION.
The IMMENSE SALE of this REMEDY has given rise to many UNSCRUPULOUS IMITATIONS. Be careful to observe Trade Mark. Of all Chemists. 1s. 1ld., 2s. 6d., and 4s. 6d.
SOLE MANUFACTURER,
J. T. DAVENPORT, 33, Gt. Russell St., W.C.

VOL. X., No. 7.
New Monthly Series.]

JUL 23 1888
JULY, 1888.

[To Non Fellows,
PRICE 1s. 6d.

PROCEEDINGS

OF THE

Royal Geographical Society

AND

Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE		PAGE
THE ANNUAL ADDRESS ON THE PROGRESS OF GEOGRAPHY: 1887-8. By General R. STRACHEY, R.E., F.R.S., President	405	THE KAAP GOLD-FIELDS OF THE TRANS-VAAL. By FRED. JEPPE, F.R.G.S.	438
THE ISLAND OF FERNANDO DO NORONHA IN 1887. By the Rev. T. S. LEA, M.A.	424	GEOGRAPHICAL NOTES	447
A JOURNEY UP THE CROSS RIVER, WEST AFRICA. By H. H. JOHNSTON, H.B.M. Consul	435	CORRESPONDENCE	455
		THE ANNIVERSARY MEETING.	459
		PROCEEDINGS OF FOREIGN SOCIETIES	471
		NEW GEOGRAPHICAL PUBLICATIONS	473
		NEW MAPS	480

MAPS.

CROSS RIVER	436
ISLAND OF FERNANDO DO NORONHA	484
KAAP GOLD-FIELDS	484

LONDON: EDWARD STANFORD, 55, CHARING CROSS, S.W.
 PARIS: ANDRÉAU-GOUCJON. MANCHESTER: JOHN HEYWOOD. LEIPZIG: F. A. BROCKHAUS.
 VIENNA: ANTARIA & Co. EDINBURGH: DOUGLAS & FOULIS. NEW YORK: SCRIBNER & WELFORD.
 HAMBURG: L. FRIEDERICHSEN & Co. DUBLIN: HODGES, FOSTER & Co. PHILADELPHIA: LIPPINCOTT & Co.
 ST. PETERSBURG: WATRINS & Co. BERLIN: D. REIMER. MELBOURNE: GEORGE ROBERTSON & Co., LIMITED.

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR	"
KURRACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

SUMMER TOURS IN SCOTLAND.

GLASGOW and the HIGHLANDS.

(Royal Route via Crinan and Caledonian Canals.)

Tourists' Special Cabin Tickets issued during the Season, valid for six separate or consecutive days' sailing by any of Mr. Macbrayne's Steamers, £3.

THE ROYAL



MAIL STEAMERS

Columba, Chevalier, Mountaineer, Glencoe, Clydesdale, Lochiel, Handa, Mabel, Gladiator,
Iona, Grenadier, Pioneer, Claymore, Lochawe, Lochmear, Inveraray Castle, Islay, Lochness, Udea,
Fusilier, Gondolier, Glengarry, Clansman, Linnet, Cavalier, Fingal, Ethel,
Sail during the season for Kyles of Bute, Ardrishaig, Oban, Ballachulish (for Glencoe), Fort-William, Banavie, Inverness, Staffa,
Iona, Lochawe, Islay, Tobermory, Portree, Strone Ferry, Gairloch, Lochmear, Ullapool, Lochinver, Lochnaddy, Tarbert
(Harris), Stornoway, Thurso, Loch Katrine, Loch Lomond, the Trossachs, &c.; affording Tourists an opportunity of visiting
the magnificent scenery of Glencoe, the Cuchullin Hills, Quirang, Loch Coruisk, Loch Scavaig, Lochmear, the Falls of Foyers,
and the famed Islands of Staffa and Iona. OFFICIAL GUIDE, 3d.; Illustrated, 6d.; Cloth Gilt, 1s. Time Bill, with Map and
Fares, Free by Post from the owner,
DAVID MACBRAYNE, 119, HOPE STREET, GLASGOW.

TEETH LIKE PEARLS

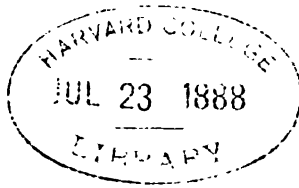
Produced by discarding cheap and gritty tooth powders and acid washes,
which ruin the enamel, and by using daily

ROWLANDS' ODONTO

A pure, fragrant, and non-gritty Tooth Powder; it whitens the teeth,
prevents decay, and gives a pleasing fragrance to the breath.

Avoid imitations and ask Chemists for ROWLANDS' ODONTO.





PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY

AND MONTHLY RECORD OF GEOGRAPHY.

The Annual Address on the Progress of Geography: 1887-8.

By General R. STRACHEY, R.E., F.R.S., President.

(Delivered at the Anniversary Meeting, May 28th, 1888.)

THE Report of the Council, which is in your hands, will have assured you of the continued prosperity of the Society, both as regards the number of our Fellows and our financial position.

During the past year we have had to lament the loss by death of seventy-two Fellows of the Society, besides four Honorary Corresponding Members. Of these I may recall the names of the late Sultan of Zanzibar, who for many years aided the explorations of Eastern Africa; Dr. Hayden, the first director of the great national geological and topographical survey of the territories of the United States of America; the Rev. Mr. Comber, for many years connected with geographical discovery on the West Coast of Africa and especially the basin of the Congo; Sir Julius von Haast, whose name will always be associated with the geography and geology of New Zealand; Admirals Spratt and Denham, eminent as naval surveyors; and Sir Barrow Ellis, a distinguished Indian civilian, who was for many years a Member of our Council.

Although the retirement of Mr. Clements Markham from the office of our Honorary Secretary has already been prominently brought to your notice to-day, I feel that the usual Annual Address of your President would be incomplete if it did not contain a specific recognition of the highly valued services Mr. Markham has rendered to the Society during his long-continued connection with it, which have led to the award to him of the Founder's Medal. It is impossible for me to doubt that much of the popularity of the Society, and of the success of its efforts to advance geographical knowledge and exploration during the last twenty-five years, have been due to Mr. Markham's never-failing energy and industry, and I feel assured that the Fellows will desire that the yearly summary of our proceedings shall contain a prominent record of our sense of the obligations under which the Society and the cause of geographical

No. VII.—JULY 1888.]

2 F

research have been placed by our late highly esteemed Secretary. It has been a cause of sincere satisfaction to the Council that Mr. Markham, although he withdraws from the post of Secretary, will continue to retain his seat among us.

I expressed a hope last year that at the present meeting of the Society I might be able to inform you that the whole of the arrangements which have been in progress for some years past, for the improvement and extension of geographical education with the aid of contributions from the funds of the Society, had been successfully carried out. I am happy to be able to say that this hope has been practically realised. The University of Oxford has already appointed one of our Fellows, Mr. Mackinder, by whom an excellent paper on Geographical Education was read before the Society last year, to be Reader in Geography at that University. At Cambridge the needful preliminary steps have been taken for selecting a Lecturer on Geography, and the nomination will, I believe, be completed in the course of next month. The examination of pupils at the training colleges, for proficiency in geography, conducted by the Education Department, has been carried out with successful results in the manner agreed upon, and, as you are aware, the awards have been to-day announced, and the prizes presented to the successful candidates. The aid hitherto given to the Oxford University Extension lectures has also been continued during the past year.

The Fellows may, I think, now remain satisfied that the Society has done all that can reasonably be expected of it for the improvement of geographical education. The results of our efforts in this direction must be awaited, and I trust that they will be found to be adequate.

But I am not on this account about to say to you, "Rest and be thankful." In the onward course of knowledge, and the search for it, there should be no rest. My injunction rather is—Think nothing gained till nought remain. Seek ever for other fields of usefulness.

It has been an occasional subject of remark in the address made by the Presidents of this Society in past years, that with the gradual extension of geographical knowledge the scope for discovery must necessarily become more restricted, and that the narratives of expeditions into hitherto unvisited countries must constantly become fewer and at length cease. But though this is an obvious truism, a retrospect of the work done by geographers, as indicated by the publications of this and other kindred societies, so far from showing any falling off in the subjects deemed worthy of record, gives clear evidence quite in the opposite direction.

There can be little doubt that the principal stimulus to the production of these materials has been the growing demand for improved and increased geographical knowledge among all classes of the community. The importance of such improved knowledge, as you are well aware, has long been recognised by us, and has been urged on the public

through the advice and action of our Society; and without claiming undue credit for our own share in the result, we may fairly congratulate ourselves on having been in advance of the movement which has at length led to the general acceptance of our contention, and on having thus justified the guardianship of this branch of knowledge which we have accepted under our charter.

But a very important element in the increased interest in geography of which I have spoken is unquestionably the greatly augmented facilities for visiting distant parts of the globe, which have within a comparatively small number of years been afforded to all. The intercourse with foreign countries thus stimulated has been accompanied by a vast expansion of commerce and colonisation, and has brought together in a manner hitherto wholly unknown, and formerly almost inconceivable, all the nations of the earth. Distance is no longer an obstacle that may not be readily surmounted, and for the practical affairs of man the globe has become contracted to very narrow dimensions. With this drawing together of all parts of the earth the perception of their common interests, and the desire to obtain a satisfactory knowledge of all that concerns them, now that they come within the reach of our practical life, has become correspondingly increased; and with the desire to obtain such knowledge the facilities for acquiring it have been enlarged also. In these circumstances our Society need not fear that the supply of materials for our 'Proceedings' or papers for our meetings is likely to fail.

It is right to remark, however, that as a necessary result of the keener interest now felt in the acquisition of more complete knowledge of the various parts of the earth, there have arisen of late years discussions as to the legitimate limits of geography, and how the line should be drawn between it and the other cognate branches of science with which it is naturally associated. It will not be out of place, therefore, if I here briefly state the conclusions at which I have myself arrived, referring you to the lectures which have been recently printed in our 'Proceedings' for a more full statement of my views on this subject.

Assuming that by the word geography we mean the branch of knowledge that undertakes to describe the surface of the earth, it becomes apparent at the outset that there is very much beyond mere topography that calls for our attention. Besides the form and magnitude of the earth, without a knowledge of which the preparation of correct maps is not possible, its relation to the great system of heavenly bodies of which it forms an element, and its movements, cannot be excluded from consideration; for on these our globe is dependent for the manner in which it receives the supply of heat and light which fits it for human habitation, and indeed the support of life in any form, and for such essential conditions of our existence as the recurrence of day and night, and the succession of the seasons.

The study of the distribution of the land and sea, of the continents

and islands, the presence of mountains, volcanoes, lakes, rivers, and other features of the surface, rightly leads to inquiry as to the manner of their formation, and brings within our view the past history of the globe and the evidence of the former conditions to which it has been subject.

The phenomena presented by the atmosphere, on the states of which depend the varying climates of the different parts of the earth, and through the agency of which all living things are supplied with the essentials of existence, heat and moisture, and indirectly all the fundamental conditions of man's occupation of the earth are determined, open a further field of investigation, from which it is not possible to exclude those who would treat of the geography of the globe.

Nor can any description of the earth be otherwise than most incomplete unless it presents a view of the chief forms of vegetable and animal life distributed in the ocean and over the land, which characterise the different parts of the globe, and furnish the habitable earth for man's occupation.

Lastly, without question, must be included within the range of scientific geography the distribution of the several groups of the human race, and their relations to one another, together with inquiries into the extent and manner of the dependence of the history of various nations, their character and occupations, on the physical conditions of the countries they inhabit.

A view of geography such as this suggests no claim to any usurped supremacy over, or interference with, these special branches of knowledge but rather recognises its dependence on them all. It regards the earth as the bond which holds together and supports all that is seen on its surface, and seeks to give a combined view of the whole.

Neither does geography, thus regarded, demand of those who would aid in its progress any unusual or universal knowledge. The division of labour among many at the outset, and co-operation in bringing together the work of all to complete their task, is as suitable and as necessary in this branch of human action as in any other. We may hope that with better trained travellers the results of observation may be more directly and immediately conducive to accurate knowledge, but no faithful record of facts is without its value, and no one need despair of being able to make useful contributions to the sum of human knowledge. At the same time, as scientific education is extended our standard of excellence should also be advanced, and without any intention of undervaluing the papers which are brought before the Society, I may be allowed to express the desire of seeing a somewhat less personal character given to them, and that travellers should review their experiences more in relation to the general body of facts that come under their observation, and the circumstances of the countries they visit and describe, and less as incidents mainly affecting themselves. Accounts

of personal adventure will always add to the interest that attaches to the exploration of unknown countries, but from the point of view of geography, the mountains, the deserts, and the seas are the main objects of consideration, rather than the fatigues and perils encountered in crossing them.

I will conclude my remarks on these subjects by hoping that more of our travellers may prepare themselves for the tasks they undertake, not only by acquiring some knowledge of surveying and of the methods of fixing their geographical position, but also by some preliminary instruction in geology, as well as in botany and zoology. Even a very rudimentary knowledge of these subjects would enable travellers to add much to the value of their explorations, and would enhance no less their own enjoyment. It would further greatly increase their capacity for observation, a faculty which requires cultivation like all others, and would often open for them the way to that more extended knowledge and appreciation of these sciences, which can only be thoroughly acquired by direct intercourse with the face of nature, for which the life of the traveller affords the best opportunities. There is also another direction in which much may be done without the necessity for laborious previous study, or the aid of elaborate instrumental appliances. Far too little attention is commonly given to the extreme importance of the local conditions of climate in all that relates to any country, whether it be the development of animal or vegetable life, or the occupations and characteristics of the races of men found there, or its fitness for colonisation, or capacity for production. To obtain sufficient data to throw valuable light on this subject, almost the only apparatus requisite would be one or two thermometers, and, if possible, a barometer or aneroid. By the use of these instruments, and suitable observations of the direction of the prevailing winds, and their local variations, periodical or otherwise, together with records of the occurrence of rain, and, when possible, its amount, many of the leading peculiarities of the climate of a country may be ascertained in a comparatively short time, and with little labour.

The manner in which the conditions of climate are dependent on the geographical features of the sea and land and position on the globe is often very striking; and an excellent illustration of this may be obtained by a comparison of the climate of London with that of the north of Scotland during the last six months, which is well worthy of your attention.

The Meteorological Office issues weekly registers, obtained from nearly eighty stations distributed over the British Isles, of what (on a suggestion of my own) has been termed the Accumulated Temperature. This signifies the amount and duration of the excess or defect of the temperature above or below an assumed standard, which, for reasons into which

I need not enter, is 42° F. It is expressed in day-degrees, a day-degree signifying one degree of such excess or defect continued for 24 hours, or a larger number of degrees for a correspondingly diminished time, or a smaller number of degrees for a correspondingly increased time.

For the purpose of the comparison of which I speak, I have selected three Scottish stations—Sumburgh Head, at the south extremity of the Shetland Isles; Stornoway, on the Island of Lewis; and Nairn, near Inverness. The first of these places is about 550 miles north of London, the second about 500 miles, and the last 400 miles. For the five months including November and December of last year, and January, February, and March of the present year, the total accumulated temperature *above* 42° F. at the several places was as follows:—

Sumburgh Head	..	..	51	day-degrees.
Stornoway	..	..	156	"
Nairn	..	..	146	"
London	..	..	137	"

The corresponding quantities *below* 42° F. were—

Sumburgh Head	..	..	752	day-degrees.
Stornoway	..	..	652	"
Nairn	..	..	866	"
London	..	..	732	"

These figures show that during this period of 17 weeks or 119 days Stornoway has secured 19 day-degrees of heat *above* 42° F. more than London, or about 14 per cent. more, and had experienced 80 day-degrees *below* 42° F. less than London, or about 9 per cent. less. On the whole, if we assume 42° F. as a neutral temperature from which to reckon, the last winter at London has had nearly 12 per cent. more cold than the station in the Hebrides, and has had about 12 per cent. less heat. Nairn, on the same basis, would have had 7 per cent. more heat than London, but would have had nearly 18 per cent. more cold. Sumburgh Head would have had 30 per cent. less heat than London, but would have had only 8 per cent. more cold.

If the month of April be brought into the account, the relative position of London would be considerably improved, but Stornoway would still show 80 day-degrees less cold than London, though London would have got 42 day-degrees more heat than Stornoway.

Lest you should too hastily think from this account of its winter climate that Stornoway is a place to be sought in preference to our more southern regions, I must add that out of the 119 days in the five months it rained on 109, and in the 154 days of the six months rain fell on 138. The corresponding numbers for London were only 71 and 88. On the other hand, the bright sunshine at Stornoway extended to 248 hours in the five months, and 381 hours in the six months; while London only enjoyed 137 hours in the five months, and 234 hours in the six months.

These remarkable results, which will probably have been little anti-

ipated by any of my audience, may have been to some extent due to the special character of the past winter. But the comparatively mild winters on the coasts of Northern and Western Scotland have been already well known, and the cause has been clearly seen to be the passage of the warm water carried up by the ocean current known as the Gulf Stream along the western coasts of our islands, and the prevailing south-westerly winds, both of which in turn are results of the eastward impulse given by the rotation of the earth to ocean and aerial currents, originally directed from the Equator towards the Arctic regions.

I will now proceed, according to custom, to pass in review the chief geographical events of the year.

The subject which continues to excite the largest share of public attention and first claims my notice, is the expedition under the leadership of Mr. Stanley, who left this country more than fifteen months ago, for the relief of Emin Pasha. In this expedition, as you are aware, this Society takes especial interest, on account of the large extent of unknown country in the heart of Africa which it has to traverse, before reaching the remote station where the courageous administrator of the former Equatorial Province of Egypt has maintained himself, since his communications viâ the Nile were cut off by the insurrection in the Soudan. Stanley having established a stockaded post at the head of navigation on the river Aruwimi, started on his journey across the continent near the end of June 1887, having then some 450 miles to march before reaching the western shores of Albert Nyanza, where he expected to find an advance party sent to meet him by Emin. He was heard from some days after he had started, but since then he and his large caravan of 600 or 700 men have been lost to the outside world. Meantime we have much later news from Emin himself, by the eastern route and Zanzibar, the last date being November 15th, when Emin's scouts, sent in the direction of the route by which Stanley was expected to come, had returned without obtaining any news of the expedition.

Such is the situation of affairs at the present time, but those best acquainted with the neighbouring country and with Stanley's plans, entertain no fear of his safety and ultimate success. Emin Pasha himself attributes the delay to the broad marshes and river beds which lie on the route between the Yambuya camp on the Aruwimi and the Albert Lake and the mountainous country (the "Blue Mountains" of Sir Samuel Baker) which lie along the western side of the lake; and Dr. Junker, who travelled over a large extent of country to the north of the route, in an address to the Berlin Geographical Society on the 21st ult., is inclined to explain it by the difficulty Stanley has found in obtaining food for his large force in a country like that to the west of Albert Nyanza, where the land is divided up among a multitude of petty communities having no surplus food and no cattle. He thinks that Stanley would experience

great difficulties and delays in obtaining necessary supplies, and that it is probable that after a time he would abandon the direct line to the lake and strike north-eastward through the southern Niam Niam country, where there are powerful chiefs and a large extent of populous country rich in grain and cattle. Delays here would occur from the necessity of palavers with each successive chief about the food supply, but the march would be safe, though much increased in length, and a four months' journey is not longer than might be expected. Dr. Junker, in short, has confidence in Stanley's ultimate success in reaching Wadelai.

These remarks seem necessary, in order to relieve the anxiety which is naturally felt regarding the expedition; but at any moment news may be telegraphed—from Zanzibar, as Dr. Junker confidently expects—of its safe arrival at Wadelai.

The most interesting geographical achievement of the year in the basin of the Congo has been the practical confirmation of the identity of the Welle, the great stream discovered by Schweinfurth in the Niam Niam country of the Soudan, with the Mobangi, one of the chief tributaries of the Congo. This has been due to the persevering efforts of the Belgian officer Lieut. Van Gèle, who succeeded in November last in ascending the Mobangi from the Congo, in a small steamer, to a point 200 miles eastward of that reached by Grenfell in 1885, and within 70 miles of that reached by Dr. Junker on the Welle from the opposite direction in May 1883, both points being in the same latitude ($4^{\circ} 20' N.$) and sufficient being known of the region south and north to preclude the supposition that the two rivers have separate courses in the interval.

Further to the east an expedition led by Lieut. Wissmann, who has to-day received one of our medals in recognition of his remarkable journeys, has opened up new routes from the Kassai river, north of the Sankuru and Lomami, across to the Lualaba, the great eastern affluent of the Congo. He was, however, compelled to abandon the intention of following that river northward, and thence struck eastward, and so travelled to the east coast via Lakes Tanganyika, Nyassa, and the Shiré, and down the Zambesi, thus accomplishing his second march across the African continent.

In Eastern Africa one of the most noteworthy events of the year has been the ascent of the snow-capped Mount Kilima-njaro by Dr. Meyer. The traveller, however, did not actually reach the summit, but only to the foot of what he describes as the ice-wall which surrounds the crater, at least on the south-eastern side of the peak. Journeys of minor extent which have added considerably to our topographical knowledge of the country have been accomplished in the interior south of this great mountain, one by Bishop Parker and the Rev. J. Blackburn of the Church Missionary Society, both of whom have since fallen victims to the deadly African climate, through a picturesque, hilly, and well-wooded region, overland from Mombasa to Mamboia; the other by

Count Pfeil through the great district of Useguha, by which good results to physical and economic geography have been obtained, especially in relation to the nature of the soils and products.

In the Nyassa region a real service has been rendered to geography by the Rev. A. Hetherwick, who has definitely set at rest the question of the watershed of the Lujenda-Rovuma river system and Lake Shirwa, which had been left somewhat undecided by Mr. O'Neill and other previous explorers. Mr. Hetherwick's account of the journey he made last autumn from the mission station east of the Shiré, to Lake Namaramba, published, with his map, in the January number of our 'Proceedings,' contains besides additions of importance to the topography of the mountainous district between the Shiré and Lake Shirwa.

South of the Zambesi Mr. Selous has brought to a conclusion another of his adventurous journeys in the interior of Matabele and Mashona Lands, and has favoured us with a short account of his work, and an admirable map of the whole region, in which he has combined the results of all his route-surveys with those of Baines and other previous travellers. Still further south an addition of much value has been made to the topography of Basutoland—the singular mountainous district around the sources of the Orange river—by Sir Marshall Clarke, the Commissioner of the Territory, who has communicated to us a description of a recent tour through the country, which was read at our Evening Meeting in April.

With regard to Asia, the year will be remarkable in the annals of geographical enterprise for the completion of two of the most adventurous and extensive journeys in the great central area of the continent ever carried out by Europeans. The first in order of time was that of Mr. A. D. Carey, to which I made a brief allusion in my last year's Address; the other, a few months later in date, was that of Lieutenant Younghusband, whose admirable account of his journey, read by himself at our last Evening Meeting, will be fresh in your recollections. Both journeys were carried out with only a few native attendants, without armed guards, and were brought to a successful conclusion without encountering serious obstacles, on the part of the natives or governments, throughout the thousands of miles of country traversed.

Mr. Carey started from Leh, and proceeding by a route through Rudok, never before traversed by Europeans, crossed the Kuen Lun range by a pass near Polu, and travelled thence *via* Khoten across the desert in a northerly direction to Shah Yar and Kuchar. He turned thence easterly and south-easterly along the Tarim river, and having visited Karashahr, recrossed the desert until he reached the marshy borders of Lob Nor, the lake in which the drainage of the Central Asian desert collects, where he passed the winter months. Thence he endeavoured to make his way into Tibet: he crossed the lofty mountain ranges southward until he fell in with the Chinese pilgrims' road to Lhasa, whence

he was obliged to retrace his steps, returning to India by a route to some extent over entirely new ground, viâ Sachu, Hami, and Turfan, and thence viâ Yarkand to India. His routes covered the entire circuit of Central Asia, extending over nearly 20 degrees of longitude and 10 degrees of latitude. In this remarkable journey Mr. Carey was accompanied, and greatly assisted by Mr. Dalgleish, one of our countrymen who had settled at Yarkand, and of whose much lamented murder intelligence has lately reached us. To him the world is indebted for the route surveys of Mr. Carey's journeys.

Lieutenant Younghusband had been one of the companions of Mr. James in the journey through Manchuria, of which Mr. James himself gave us an account last session, and during which the party reached the Russian settlement of Vladivostock, on the shores of the Pacific. On the termination of the Manchuria journey Lieutenant Younghusband proceeded to Peking, and obtaining a further leave of absence from his duties in India, determined on finding his way back by the nearest practicable route overland. He engaged a small party of native guides and carriers, and took the direct road to Hami viâ the Gobi desert, making a survey of his route and connecting it with that of our gold medallist, Mr. Ney Elias, who some years ago travelled to Uliassutai by a more northerly route. From Hami he continued westward to Kashgar, and thence proceeded to Yarkand, hiring a small party of Balti mountaineers, with their ponies, for the purpose of carrying out his bold conception of crossing into India by a long-disused pass over the ice-bound Mustagh Range, and after surmounting the hardships and dangers of such a course, reached India in safety.

The route-surveys and topographical notes made by Lieutenant Younghusband along the 7000 miles he travelled have been reduced in the Surveyor-General's Office in India, and the results will be of considerable value to the cartography of the regions traversed, as supplementing or correcting the previous route-maps of Prejevalsky and Carey.

Explorations of minor extent, but of some importance, have been at the same time carried out by Russian travellers in Eastern Asia. During the year the three years' travels of M. Potanin and his wife, and their companion M. Skassi, the topographer, in Mongolia and Kan Su, have been brought to a conclusion, and their large collections in zoology and botany brought in safety to Russia. Two other Russian travellers, MM. Garnak and Ressine, have been engaged in exploring the Khingan range, which separates Mongolia from Manchuria, filling up, as we learn from Russian sources, the lacunæ in our knowledge of this mountain chain left by the researches of previous Russian travellers.

In the extreme north of the Russian-Asiatic dominions good scientific work has been accomplished by Von Toll and Dr. Bunge in the Liakov, or New Siberia, Islands, in the Arctic Sea off the mouth of the Lena.

These remote lands, reported by casual native visitors to be covered with bones and driftwood, were found (in lat. about 75° N.) to contain extensive tertiary beds rich in fossil plants, corresponding with those of Disco in Greenland and Spitzbergen. Remains, in great abundance, were also found of the mammoth, woolly rhinoceros, and other large mammals.

In Southern Asia valuable geographical work has also been done, or made known during the year. First in importance is the map of Siam, contributed by Mr. J. M'Carthy, with a paper, to the 'Proceedings' of our Society, as the condensed result of his six years' work as Superintendent of Surveys to the Siamese Government. This admirable work has well earned for Mr. M'Carthy the honour of the Murchison Premium, which has been awarded to him by the Council. In Burma, whence we may expect in the near future large additions to our geographical knowledge, a paper on the Ruby Mines district, containing much original information regarding the country and its inhabitants, has been contributed to our 'Proceedings,' with a map founded on his own surveys, by Mr. Robert Gordon. The journey of General Haig through the interior of Yemen, from Hodeida to Sanaa and thence south to Aden, of which an account was given to us last June by the traveller himself, must also be recorded as one of the year's contributions to our geographical knowledge of Asia.

On the border line between Asia and Europe, a journey which has attracted a large share of public attention, is the rapid and successful summer trip last year of our Honorary Secretary, Mr. Freshfield, to the scenes of his former explorations in the Caucasus. The results have been communicated to the Society, and supply a considerable addition to our exact topographical knowledge of that part of the lofty chain which dominates the valleys of Suanetia. Mr. Freshfield speaks with warm praise of the cordial assistance rendered him by the Russian officials, and one of the cheering results of his journey is the organisation of three other parties of skilled mountain climbers and topographers, for expeditions to the Caucasus in the present summer.

In the Malay Archipelago, the work of the year, as far as geographical exploration is concerned, has been limited to the British territory of North Borneo, on which subject two papers have been read and discussed at our Evening Meetings. The first was by Mr. D. D. Daly, c.e., one of the Assistant Residents of the North Borneo Company, and was illustrated by a map founded on surveys in the interior by the author; the other was by Admiral Mayne, which gave a resumé of the various exploratory expeditions in the territory since 1878, most of which had been promoted by the North Borneo Company.

Efforts to penetrate the interior of New Guinea have continued to be made, but at present without much success. An expedition was sent out in July last by the Melbourne branch of the Geographical Society of Australia, with the object, like its predecessors, of reaching the summit

of the Owen Stanley range. The command was given to Mr. Cuthbertson, an experienced surveyor, and Mr. Sayer was attached to the party as naturalist. The land journey was commenced on the 2nd of August at a point 30 miles to the southward of Port Moresby, and for 17 miles the track passed over grassy flats and low hills, with stunted eucalyptus trees; the banks of a river, the Kemp Welch, only being clothed with jungle. Further on the country becomes mountainous, clothed with dense forest and thickly populated. Through this, to the foot of the range, the track lay partly up the bed of mountain torrents, and partly over minor hills of about 2000 feet high. At length, on the 30th August, what was supposed to be the summit of Mount Obree was reached, a peak fixed by the *Rattlesnake* Survey at 10,246 feet; but as the native attendants all decamped, and the weather was most unfavourable, no distant view could be obtained, and no information therefore gained as regards the nature of the interior, whether a plateau or a continuation of the abruptly hilly and rugged country which has hitherto impeded all communication on the seaward side of the range. The loftier peak of Mount Owen Stanley was thought to be visible, through the mists of the heavy downpour, to the north-west. A considerable collection of plants and animals was obtained during the journey. Mr. Cuthbertson's report and a large-scale map of his route have been recently published in the Journal of the Victoria branch of the Geographical Society of Australia.*

Further west, in the Gulf of Papua, new rivers and harbours have been discovered. Our Associate, Mr. Theodore Bevan, has made two rapid journeys in small steamers to the large and complicated river delta on the eastern side of the gulf, and roughly surveyed two fine rivers and several minor streams and channels, and Captain J. M. Hennessy, in the mission steamer *Ellengowan*, has since visited the same part of the coast and discovered a new harbour. The large river, named by Mr. Bevan the Jubilee, is considered by him and by the Rev. W. G. Lawes as undoubtedly the same as that discovered by the Rev. Mr. Chalmers some years previously, and named by him the Wickham.

In German New Guinea, Dr. Schrader in June last ascended the newly-discovered Empress Augusta river in a steamer for 380 miles, and it is now believed that this great stream is navigable up to and beyond the Dutch frontier.

The large group of the Solomon Islands, south-east of New Guinea, notorious for the ferocious customs of its Melanesian inhabitants, has recently been partly explored, chiefly as regards its natural history, by Mr. Woodford, who gave us an interesting account of his experiences and of the nature of the country at one of our evening meetings. He is the first European who has penetrated into the interior of the mountainous island of Guadalcanar.

* Vol. i. part ii.

Explorations of interest have been made in the continent of America during the year, some of which have specially come before us and may be briefly alluded to. One was Mr. R. F. Holme's visit to the interior of Labrador in the summer of 1887. The map of his route towards the central lakes from Hamilton Inlet, which he communicated to the Society together with an account of his journey, considerably modifies previous maps of the country, and his observations on the summer climate and the extensive woodlands of the interior are of much novelty and value. In South America we have received an account of Mr. W. J. Steains' meritorious explorations of the basin of the Rio Doce in Brazil. In the far west of Brazil, we learn that the accomplished German traveller, Dr. Von den Steinen, has started from Cuyabá on a second exploration of the Xingu river, one of the great southern tributaries of the Amazons. A small expedition, aided by a grant from the Royal Society, has been exploring exhaustively the geology and biology of the island of Fernando de Noronha, some 200 miles off the coast of Brazil. It was carried out by Mr. Ridley of the British Museum, and Professor Ramage of Edinburgh, aided by the Rev. T. S. Lea, who joined the party at Pernambuco as a volunteer, and gave us an interesting general account of the work accomplished. The scientific results of the expedition will be published in due time, after the zoological and botanical collections have been examined and named.

Lastly, I may mention that an expedition of a novel kind has recently started for the east coast of Greenland, in lat. 66°, with the object of attempting to cross on sledges and ice-skates the icy plateau of the interior to the opposite coast near Disco. Its leader is M. Nansen, an adventurous and intelligent young Norwegian, Curator of the Museum at Bergen, and he takes with him a well-selected party of Lapps and icemen. He paid a short visit to the Society's rooms before finally setting sail from Granton, and spoke with great confidence of success, and of being able to contribute somewhat to our knowledge of the physical geography of the country.

I am indebted for the following brief Report of Admiralty Surveys during the year 1887, to the Hydrographer, Captain W. J. L. Wharton, R.N., F.R.S.

Hydrographical surveys under the orders of the Lords Commissioners of the Admiralty have been in progress on the shores of Great Britain; in the river St. Lawrence; British Guiana; St. Lucia Island; the Grecian shores; Red Sea; Ceylon; Indian Ocean; Tasmania; Queensland; Coral Sea; and Louisiade Archipelago. The surveying vessels employed in the above surveys consisted of eight steam-ships of war, one sailing schooner of H.M. Navy, and two hired small steam-ships, manned by 81 officers and 731 men. A full report of the work performed by each surveying vessel during 1887 will shortly be presented to Parliament, in accordance with the annual custom.

The following brief remarks define what has been accomplished :—
On the shores of England :—

That portion of the river Thames between Broadness (near Gravesend) and the Royal Albert Dock, re-sounded; and the re-survey of the river Medway completed to Rochester Bridge. At Portsmouth, a re-examination of the bar in the entrance to the harbour, also the edges of Ryde Sand and Norman's-land bank at Spithead.

In the Downs, the main channel through the Gull Stream, and the Goodwin Sands, re-surveyed,—the survey showing extensive changes both in the channels and form of the sands since last examined in 1865, notably that the main body of the Goodwin has moved to the westward half a mile. It is worthy of mention that previous surveys of the Goodwin Sands point to the fact that these sands, after moving eastward from 1795 to 1864, are now on the swing westward; and its western edge has again reached the position of 1795.

In the North Sea, the area northward of Cromer to the Outer Dowsing shoal charted in extension of the work executed in 1886; Harwich harbour re-sounded; and a new chart of Heligoland on a large scale executed.

On foreign shores—

A re-survey of the Greek coast south of the boundary line to Skiatho island, with the entrance to the Gulf of Volo, and separate plans of Volo and Skiatho harbours.

In the Red Sea, an examination of the area about 18 miles north of Jebel Zukur island, near the direct track of the main traffic, and vicinity of the uncharted danger on which two British steam-vessels had been reported to have struck and afterwards foundered. [Three searches by H.M. ships were made during 1887 to ascertain the position of this danger, but it was not until a fourth was made in April of this year that a successful result proved the hidden danger to be a small coral patch of 15 feet least water on it, with 28 to 30 fathoms around the rock.]

In the river St. Lawrence, a re-survey of the north-eastern portion of "The Traverses," and also that portion of the river fronting Quebec. In British Guiana, an examination of the shore-line with its approaches from Essequibo river, westward to Moruka river. The survey of St. Lucia island, prosecuted from April to December, was well advanced at the end of 1887.

In China, the main triangulation of the sea-board southward from Shanghai commenced in 1885, completed in detail to Macao; this is a work of great importance for the accurate construction of the charts of this region. A new chart of the northern part of Chusan archipelago, embracing the several islands of the Rugged, Parker, and Saddle groups; as also Tsu-san island (hitherto known as Chin-san).

On the eastern coast of Ceylon, a complete survey from Maha-

gagabawa, in latitude $6^{\circ} 30' N.$, northward to Foul point, in latitude $8^{\circ} 35' N.$, at the south entrance to Trincomali, with the approaches to the shore-line sounded out to the 100 fathoms, about ten miles from the shore. A new chart of this neighbourhood was much needed, as it has been of late years the scene of several shipwrecks, owing—as was stated—to the existence of unmarked dangers. This allegation proved unfounded, but the mountains which serve as landmarks were in many cases incorrectly placed.

In the Indian Ocean, a survey of Christmas Island, accompanied with a full report of its characteristics, and a complete collection of botanical, natural history, and geological specimens. Deep-sea soundings over a large portion of the Indian Ocean where no soundings had ever before been obtained, and also in the positions assigned to doubtful shoal spots.

The Queensland coast survey completed northward to the south entrance of Rockingham channel. In Tasmania, the survey of D'Entrecasteaux channel completed to South Cape.

In the Coral Sea, the outer edge of the Great Barrier reef from Flinders passage northwards to Trinity Opening charted, and three new openings, named respectively Grafton, Palm, and Magnetic passages, surveyed; that of Grafton proved to be wide, presenting few difficulties and easily made out from seaward in fine weather. Palm and Magnetic passages (north-east of Townsville) are also good passages through detached reefs, but require to be marked with beacons before vessels will be able to use them in all weathers from seaward. A new survey of Osprey reef, the north-west danger bordering the outer route to Torres Strait, showed that this reef was very much longer than hitherto shown. A large area between the several reefs surveyed in 1886, sounded over in order to clear up the route to New Guinea from the Queensland coast about Townsville and to the northward. A survey of that portion of the Louisiade Archipelago from Duperre Island on the west to the eastern side of Kaluma Island, with separate plans of Moturma Island anchorage and Robinson anchorage.

Under the orders of the Indian Government, a new survey of Megna flats, with the seaward approaches to Chittagong; also new charts of Manners strait and Duncan passage, Andaman islands; Beypore and Calicut roadsteads on the coast of Malabar, with the shore-line north to Sacrifice rocks; the small ports of Porebandar and Navibandar [in Kathiawar; as also of Yé river on the coast of Tenasserim.

Under the Dominion Government of Canada the survey of the channel on the north side of Grand Manitoulin Island in Lake Huron, extended westward from Clapperton Island to Meldrum point, strait of Missis-sauga.

The Hydrographic Department during the year has published 58 new charts and plans, and improved 25 charts by the addition of 28 new plans: 2591 corrections have been made to the chart plates.

Indian Surveys.—The surveys and explorations made in connection with the Indian Survey Department are this year of considerable interest. Foremost amongst those chronicled in the last report is the exploration of an important part of the course of the Sangpo river from its lowest known point, Gyala Jong, which lies a little past the acute bend where the river forsakes its easterly course to enter on its southward descent into India. The explorer, who is distinguished by the initials K. P., in lieu of a name, had been deputed as far back as 1880 to serve as assistant to a Chinese lama, whose task was to throw marked logs of timber into the Sangpo, with the object of seeing whether these logs would duly emerge on British territory. The lama, however, turned out to be a rascal, for he first sold his companion into slavery and then fled to China. K. P., however, seems to have escaped from captivity and to have successfully traced the downward course of the Sangpo close to a spot called Miri Padam, whence the plains of India were distant about 35 miles to the south-east, and the "haze" above them could be seen in the distance. The great falls of the river, 150 feet in height, were passed about 25 miles below the great bend above referred to, where the Sangpo veers right round and, flowing southwards, bursts through the Himalayan chain. Between Tibetan territory and the tracts inhabited by the Padams or Abors, three tribes of aborigines, entitled Lo Nakpo, Lo Karpo and Lo Tawa ("Lo" signifies barbarous in Tibetan) who inhabit a pleasant district, having brought the lands on either side of the Sangpo into a high state of cultivation, and mangoes, plantains, and oranges thrive. Both K. P. and Captain Harman agree in making a large river join the Sangpo from the north-east, a little above Miri Padam, and this Colonel Tanner assumes to be A—k's Nagong Chu.

To the west of these regions a large portion of Bhutan has been explored by two other natives, R. N. and P. A., who both crossed the strip of Tibetan possessions where the Chumbi valley juts forward and meets British territory, and traversed some new ground in western Bhutan, but were forced by the disturbed state of the country to relinquish their idea of striking across the country in a course south of and parallel with the route followed by Captain R. Boileau Pemberton's mission to the court of the Deb Raja in 1837-38. R. N. left the hills therefore at Buxa Duar fort and re-entered them at Dewanjiri, from which point his party crossed the Dangma Chu and Kuru Chu rivers which go to form the Monas, which joins the Brahmaputra at Goalpara. The former is spanned by a substantial chain bridge about 350 feet long and of great antiquity. The next river, the Kuru or Lhobrak Chu, now proves to be the largest river of Bhutan, and drains the tract between the Yamdok Pho Mo Chang Thang and Tigu lakes, and of the glaciers of the Kulha Kangri and other great ranges. For many years geographers appear to have been in great uncertainty regarding the lower course of the Lhobrak, and though the writer of the article on the "Himalayas" in Hunter's *Gazetteer* rightly conjectures the Lhobrak Chu and Monas to be identical, in Mr. Markham's work on Tibet (Bogle and Manning) the Lhobrak Chu is supposed to be the Subansiri. The present exploration of R. N. is therefore an important geographical discovery. He also reports the existence of a previously unknown tribe, the Chingmis, in the eastern part of Bhutan, who are of more amiable disposition and live in better houses than the Bhutanese, but do not, as they do, form part of the official class. Though resembling the Bhutanese in dress they differ in wearing pigtailed. The Monla Kachung Pass (17,500 feet), by which R. N. crossed into Tibet, is situated almost on the meridian of Goalpara, and is said by Colonel Tanner (who writes the narrative) to be one of the most important between Bhutan and Tibet. R. N. eventually returned to India by way of Tawang, having made the greatest contributions to our knowledge of the people and geography of Bhutan since Pemberton's time.

Another piece of exploring work by a native emissary, M. H., has resulted in

the tracing of the Dndhkosi to its source, and has filled up a gap in the geography of Tibet between Dingri Jonkhajong and Kirong, besides furnishing new information as to the course of the Gandak above Tirbenighat.

In Upper Burma, Major J. R. Hobday, Lieut. H. M. Jackson, Mr. Wyatt, and others have been actively engaged in mapping out the country, the general results amounting to 15,000 square miles of triangulation, and 11,000 square miles in the Shan States, Ruby Mines, Mandalay, and other districts. A large-scale survey of Mandalay is also in progress. The difficulties in the way of surveying in Burma were, however, exceptionally great, for the disturbed state of the country compelled the surveyors to keep up with the troops, who marched from 10 to 15 miles a day, while dense forests, undergrowth, and high grass were everywhere met. In March too the undergrowth either dies or is burnt, and an impenetrable haze pervades the atmosphere till the commencement of the rains. Colonel Woodthorpe and Mr. Ogle accompanied a military column from Manipur into the Kubo valley, and surveyed the whole of that tract as well as a large part of the Lekayain district. They also succeeded in carrying the triangulation from Manipur, which is connected with the main triangulation of India, to the neighbourhood of Mandalay and in effecting a junction with that executed by Major Hobday. Mr. Ogle, too, has recently accompanied a detachment which has successfully solved the question of a practicable route from Assam to Upper Burma by way of the Patkoi Pass. It is satisfactory thus to observe that the survey of this newly acquired country has been so promptly and energetically taken in hand, and that the opening up of free communication between it and India bids fair to be soon accomplished.

The process of mapping out the cultivated and revenue-paying regions of India is advancing, and six large-scale or cadastral survey parties were engaged on this work during the year 1886-87. A new scale of Calcutta, on the scale of 50 feet to an inch, has also been taken in hand, the former survey executed in 1847-49 having become out of date. The topographical work has had to be contracted to meet the demands for remunerative surveys in the Central Provinces, but eight parties were employed in the Bombay Presidency, in Gujarat, in the Southern Maratha country, in Baluchistan, in the Mirzapur district, in the Himalayas, in Madura and Tinnevely, and in the Nicobar Islands. In the case of the Nicobars, which had previously been fixed from the surveys of Danish and Austrian ships, an accurate survey of the coast-lines was required, as well as a correct determination of their position, for purposes of navigation, while as regards the interior of the islands, a general topographical survey was wanted, as well as an enlarged plan of the settlement of Kamorta. With the exception of a complete topographical survey of the interior, which is for the most part covered with dense forest, these objects were secured. A few conspicuous peaks were, however, fixed trigonometrically, and some of the chief watersheds and watercourses were laid down with more or less approximation to the truth. The scenery, especially of the Great and Little Nicobars, is of indescribable beauty, the tortuous courses of some of the rivers being fringed with tree-ferns and tropical vegetation, and picturesque hills filling up the background, while the sea-beach consists largely of living coral washed by water of marvellous purity. Shells, too, of every shape and hue abound. The inhabitants are allied to the Malays, and are very strong thickly built men, not much if at all inferior to Europeans in physique, of a reddish-brown colour, and in every way totally distinct from their near neighbours the Adamanese, who are intensely black, with woolly hair, and are among the tiniest races of the globe, very few of the men reaching five feet in height. The chief characteristic of the Nicobarese is unconquerable laziness, this being greatly fostered by their having pandanus fruit, coco-nuts, and other necessities always ready to hand. Famine, droughts, and wars are things unknown to them. They are

wonderfully quick at learning languages, but Christianity has made absolutely no progress among them, it being currently reported that fifteen Danish missionaries spent twenty years among them without making a single convert.

The survey of Baluchistan advances steadily, and during the year 1886-87 the country topographically surveyed comprised portions of the Bugti and Marri Hills, the Khetrani Hills, the Bori Valley, and the Luni Pathan country in the north and the juniper forests about Ziarat. In the Marri and Bugti country the heat is described as almost unbearable, the topography is intricate, and water and supplies are very difficult to obtain. The districts are, however, important, as it is not unlikely that they will be included sooner or later in the British possessions of Pishin and Sibi, which, in the nature of things, must gradually absorb the no-man's-land intermediate between these and the British frontier proper. To provide for the correct interdependence and position of these surveys a first-class series of triangulation will also be carried along the 30th parallel between Dera Ghazi Khan and Pishin, which will join the Great Indus series, and thus form a basis for any extension of survey in Southern Afghanistan and Baluchistan.

In the drawing, lithographic engraving, and other branches of the Indian Survey a large amount of valuable work has been completed or taken in hand, one of the most important of the latter class being the new map of Afghanistan which Major Gore is busily engaged in compiling from all the surveys of the Afghan Boundary Commission and other existing material. There can be no doubt that this will form the standard map of Afghanistan for a considerable time to come.

OBITUARY FOR 1887-8.

Our losses by death during the year, from May 1st, 1887, to April 30th, 1888, have been seventy-two, besides four Honorary Corresponding Members. The list includes the names of many who had achieved reputation as geographical explorers, and a still larger number who were distinguished in other walks of life. Biographical notices of some of them have already appeared, or will shortly appear, in the obituary columns of our monthly 'Proceedings,' in which will be found records of the careers of Don MARIANO FELIPE PAZ SOLDAN; Rev. T. J. COMBER; Sir JULIUS VON HAAST; R. H. WALLACE DUNLOP; Admiral THOMAS A. B. SPRATT; Admiral IRMINGER of the Danish Navy, and Mr. WALTER MONTAGU KERR.

The Society has lost also during the year one Honorary Fellow—His Highness SYED BURGHASH IBN SYE SAID, Sultan of Zanzibar—whom the Society, and all who have at heart the promotion of geographical discovery, will remember with gratitude for the steady support which he extended, for a long series of years, to the successive expeditions for the exploration of Central Africa sent from England and other countries, which necessarily made Zanzibar their starting-point, and at which great mart of Eastern Africa their caravans had to be manned and provisioned. He died on the 26th of March last, in the 18th year of his reign.

The following is a list, arranged in alphabetical order, of all those deceased Fellows whose deaths have not been previously recorded in our pages:—

Mr. WILLIAM ALLAN; Mr. CHAS. TOLL BIDWELL (British Consul for Malaga, &c.); Captain ALEXANDER BOWERS; Commander W. H. BRETON, R.N.; Mr. G. F. BROWNING; Sir THOMAS GRAHAM BRIGGS, Bart., of Barbados, who died in London on the 11th of November last, in the 54th year of his age. He was an influential landed proprietor in the island of Barbados, much and widely respected throughout the West Indies; Mr. W. BROUGHALL; Colonel DAVID BALFOUR; Captain CHARLES BURNBY, R.N.; Mr. WILLIAM BEVAN; Mr. HENRY BAYLEY, for many years one of the

Managing Directors of the Peninsular and Oriental Company, who died, as the result of a carriage accident, on the 7th of July last, in his 61st year; Rev. J. LOWRY CARRICK, M.A.; Mr. J. FINDLATER CORSCADEN; Colonel A. A. CROLL, C.E., well known for his public-spirited and successful endeavours to promote the extension of electric telegraphy and the cheapening of telegraphic messages; Lord THOMAS CLERMONT; Mr. A. R. CAMPBELL-JOHNSON, F.R.S.; Admiral Sir H. MANGLES DENHAM, F.R.S., the eminent naval surveyor, who died on the 3rd July last at the advanced age of 88 years; Mr. C. CAMPBELL DOWNES; the Earl of DALHOUSIE; Mr. ALFRED DENISON; Admiral J. E. ERSKINE; Sir BARROW H. ELLIS, K.C.S.I., Member of the India Council, died on the 20th June last at Evian-les-Bains, in Savoy. Sir Barrow was one of the Trustees of our Society, and always took a warm interest in the subject of geography. For a series of years he gave a prize for geographical proficiency to the pupils of University College School, where he received his early education. His career in the Civil Service of India from 1843 to 1870 was an honourable and successful one; among his various appointments was that of Commissioner of Scinde, and afterwards that of Member for Bombay of the Viceroy's Council; Mr. G. T. EDWARDS, M.A.; Capt. T. KEANE FITZGERALD; Mr. A. FITZGERALD; Mr. R. GILLIES, C.E., of New Zealand; Mr. DAVID GOWAN; Sir FRANCIS W. GRANT, Bart., in early life captain of the 17th Lancers; Mr. C. HARRIS; Rev. DUNBAR S. HALKETT; Major-General H. HYDE, R.E.; Rt. Hon. A. J. BERESFORD-HOPE, M.P., the author of 'Anastatius,' widely known as an Oriental scholar and patron of art and architecture; Mr. J. A. W. HARPER; Dr. F. V. HAYDEN, who at one time occupied a prominent scientific position as Director of the Geological and Geographical Survey of the Territories in the United States. He was the first to survey and give accurate information regarding the famous Yellowstone district, since set apart by Congress as a National Park; the abolition of the Survey—as then constituted—was apparently felt by Dr. HAYDEN as a heavy blow; at least he accomplished no scientific work afterwards. He died in January last, at the comparatively early age of 59 years. Commander J. LLEWELLYN HEARNE; WALTER H. INGRAM, son of the late Mr. Herbert Ingram, founder of the *Illustrated London News*. He had travelled much in the interior of South Africa, and afterwards joined the expedition under Lord Wolseley for the relief of Gordon, during which he took an active part in the battles of Abu Klea and Metammeh, and accompanied Sir Charles Wilson in the perilous trip to the neighbourhood of Khartum; Rev. A. J. JACKSON; Mr. HUGH H. JONES; Rev. H. W. KEMP; Mr. HUGH BROOKE LOW, H.M. Resident at Perak, and formerly in the service of the Government of Sarawak. He died in London in July last, whilst engaged in bringing out a book on the Dyaks and other natives of North-Western Borneo; Dr. ALFRED MEADOWS; Mr. DUNCAN MACGREGOR; Mr. ANDREW MACLURE; Sir WILLIAM M'ARTHUR, K.C.M.G.; Mr. JAMES E. MASON, Member of the Legislative Council of Fiji; Sir ROBERT MONTGOMERY, K.C.B., G.C.S.I., the eminent Indian administrator, who since his retirement served as Member of the India Council, and occasionally took part in the discussions at our Evening Meetings; Lord GEORGE QUIN; Mr. ALFRED RICHARDS; Mr. T. ROUTLEDGE; Mr. R. RUSSELL; Mr. G. RIDLEY; Sir CHRISTOPHER RAWLINSON, formerly Chief Justice of the Supreme Court of Madras; Mr. H. ROBERTSON, M.P.; Mr. RUSSELL BROOKE ROBERTSON, British Consul at Yokohama, and Assistant Judge of Her Majesty's Court for Japan; Admiral Sir ALFRED P. RYDER, K.C.B., who was accidentally drowned in the Thames on the 30th of April last. He was the Junior of the six Admirals of the Fleet, and had been fifty-three years in the service of the Navy, during which he was actively employed in the West Indies in 1847, and commanded the *Dauntless* in the Baltic and Mediterranean during the Russian War. He was second in command of the Channel Squadron in 1868, and Commander-in-chief on the China station from 1874

to 1877, shortly after which he was made Commander-in-chief at Portsmouth, which important post he filled up to 1882. He was the author of a work on the 'Saving of Life at Sea,' and took a great interest in the encouragement of enterprise on the part of junior officers of the Navy in the direction of hydrographical and topographical surveys of the imperfectly known parts where their regular duties so often took them, on which subject he offered to provide a Prize-Fund to be administered by the Council of our Society; Mr. JOSEPH STARLING; Mr. RUSSELL SHAW; Mr. ROBERT SUTHERLAND; Mr. GRIFFITH SMITH; Mr. JAMES SPICER, the well-known philanthropist; Mr. GEORGE B. TIPPING; the MARQUIS OF WINCHESTER; Sir PHILIP EDMOND WODEHOUSE, K.C.B., G.C.S.I., who died on the 25th November last, after fifty years' service under the Foreign and Colonial Offices. His first appointments were in Ceylon; subsequently for ten years he was administrator of Honduras; in 1851 he became Governor of British Guinea; in 1861 he was appointed Governor of Cape Colony and High Commissioner in South Africa, which post he resigned in 1870, and from 1872 to 1877 he served as Governor of Bombay; Mr. ALFRED OSWALD WHITE; and Mr. FREDERICK WILLIAM WILCOCKS, J.P.

The Island of Fernando do Noronha in 1887.

By the Rev. T. S. LEA, M.A.

(Read at the Evening Meeting, April 23rd, 1888.)

Map, p. 484.

IN July of last year, Mr. H. N. Ridley, M.A., F.L.S., of the British Museum, and Mr. G. A. Ramage, of Edinburgh University, left England for the purpose of exploring the island of Fernando do Noronha, which lies about 290 miles north-east of Pernambuco. The place is the Brazilian convict settlement, and its natural history remained almost unknown, owing to the difficulty hitherto experienced of obtaining permission to land. I joined the party as a volunteer at Pernambuco, having come down from New York at the end of a tour round the world, originally undertaken for health, but which had included a certain amount of collecting for the Museum in Australia and elsewhere. I have thought that a few of the geographical details of the island might be published without interfering with the complete reports of the zoology and botany, which will shortly be issued by the British Museum.

Armed with credentials from the Brazilian Minister in London, granted by request of the Emperor, we were enabled to obtain all the needful authority from the President of the Province of Pernambuco to visit the island, where we stayed for six weeks and examined the whole place thoroughly. Our best thanks are due to the British Consul at Pernambuco, Mr. Cohen, for his assistance to us in our dealings with the Provincial Government, and also in a very special degree to Dom Joaquim Agripino Furtado de Mendonça, Director of Fernando do Noronha, for his exceeding kindness and hospitality to us during the whole of our stay.

A sum of 150*l.* was voted to Mr. Ridley by the Royal Society, and 70*l.* to Mr. Ramage by the Royal Society Club in Edinburgh. The latter gentleman is now in Dominica, where he holds an appointment under the West Indian Commission to explore the zoology. Our outfit included six or seven botanical presses, five reams of drying paper and a quantity of thin paper for delicate specimens, with envelopes, &c., for seeds; spirits of wine, bottles, and zinc drums in strong wooden cases; a set of dredges, which we did not have much chance of using; camera, and about five dozen plates, which have mostly proved successful pictures; nets, chip-boxes, and other materials for insects, and a few chemicals and medicines.

Quarters were assigned us in the Director's house, and we were hard at work on the first morning after landing, and everything went smoothly from first to last.

Mr. Ridley had timed the expedition for the end of the wet season and the beginning of the dry weather, and so we were enabled to get both the herbaceous plants and the flowers of the trees, most of which flower in the dry season, which was an important consideration. We imagine that more beetles might have been found at other times, but we were fairly successful as it was.

But before entering on a detailed account of the island, it will be best to say something about the old authorities, especially as a paper has previously been read on the subject before this Society by Dr. Rattray in 1871.*

Of Fernando do Noronha himself nothing seems to be known, and Amerigo Vespucci's account of his stay at the island and the wreck of one of his ships reads like an episode in the *Odyssey*. The place belonged first to the Dutch, then to Portugal, and, on the secession of Brazil, to that empire. It has seemingly always been used as a penal settlement, for which it is well adapted.

Dr. Rattray's account hardly deals with the natural history of the place, though he indicates it as a likely field for collecting. He well describes its climate and resources, but our expedition can, I am glad to say, report much more favourably on the condition of the convicts. He is in error when he speaks of the existence of granite, which, though common in Brazil, is not found on the island.

The best map is the Admiralty chart, which is certainly very accessible, but in some respects it is not very satisfactory. It has been prepared "from a French sketch survey of 1760, published in 1852, with additions and corrections by Staff Commander T. Pounds, H.M.S. *Bristol*, 1871"; and the names given to the different localities, though perfectly adequate for all nautical purposes, are English or French and not Portuguese. In fact none of those on the island to whom we showed the chart had ever before heard of them. Moreover, we found that several

* 'Journal R.G.S.' vol. xlii., p. 431.

of the most striking spots to which we wished to refer had no names at all. And so, even at the risk of increasing the confusion, we were obliged to invent names such as we could put on the labels of specimens from the localities. Some of these localities are of great importance in dealing with the geology of the island, and I am obliged to refer to them in this paper by our temporary nomenclature. A detailed map will probably be published in the Museum Report of the expedition, but meanwhile a provisional one may accompany this paper, on which the names not found on the chart may be marked for convenience of reference.

The total length of the whole group of islands from north-east to south-west is about $6\frac{1}{2}$ geographical miles, and the maximum width of Fernando itself is about $1\frac{1}{2}$ mile. We had no surveying instruments, and such details as we can give as to measurements can only be roughly approximate. The north-east cape of Rat Island is very rugged and precipitous, though of no great height. I tried in vain to scale the rocks, and the extreme point remained unvisited. The rest of the northern coast is also bold, and there still remain the timbers of a wreck, said to be an Italian vessel which took fire at sea and was run aground to save the lives of the crew. The rest of the island slopes to the westward, and is apparently cultivable. Large numbers of sweet potatoes have run wild and are displacing the native *Ipomæas*. On the southern shores is the blow hole, where the sea dashes up through a cavern in the raised beach of reef rock, of which more account must be given in its proper place. The guano deposits lie not far from the bay where the chart marks the landing.

Boobie Island and Egg Island are also raised masses of reef rock, which again appears on the top of the basalt of Platform Island. Mount St. Michael is a phonolite peak on which the weed invasion has hardly found a footing, and the native plants still flourish. This phonolite is a grey, close-grained columnar rock, about which much more will have to be said, as it seems to be the key to the very interesting geology of the island. Platform Island and Egg Island have a connection at low water with the main island, a small mass of reef rock. Morro do Chapeo, or the Hat Rock, seems to represent the residue of a larger block. The old fort of San José on Platform Island is quite dismantled and overgrown with convolvulus and a kind of solanum.

The north cape of the main island is stony, and there is no great wealth of vegetation, though even here many of the endemics may be found. There is a patch of blown sand at San Antonio over which the *Ipomæa pes-capræ* trails, and beyond that the ground rises towards the basaltic height on which the town is built. These hills are separated from the east hills by the valley of a small creek, but they seem to form part of the same system. The basalt is more inclined to be nodular than columnar, and the whole summit of East Hills, with East Point and

Sponge Bay, is a very rough bit of country. The endemic vegetation has not entirely disappeared; and, indeed, there are three plants belonging exclusively to the region, but the rocks are planted with pumpkin vines which trail luxuriantly over the hot black stone. Near the town there is plenty of good soil, the product of decomposed basalt, and this stretches away through the great central plain of the island, descending from the town hills until it meets the mass of similar material carried down from the Sapate or south-western basaltic heights. It would hardly be overstepping the mark to say that there must be nearly two square miles of good cultivable land on the island, and this estimate must be considerably increased if we include rocky places, &c., where patches of soil capable of supporting pumpkins and bananas may be found.

A permanent memorial of the administration of the present director will be left in the roads he has been constructing. Fort San Antonio is reached by a road roughly but strongly paved with flat blocks of stone to a width of perhaps twelve feet, and this is the type of the streets of the town. The Rua do Curral gives access to Cotton Tree Bay, but it is not paved beyond the stockyards. These, and perhaps the Suéste road, are ancient, but the western extensions are the work of the present *régime*. At the top of the hill to the south-west of the town the Sambaquichaba road diverges from the straight paved track that leads to Suéste, which latter keeps the Central Knoll on the right, and crossing the Cotton Tree Bay Creek reaches the little settlement which nestles among the coco-nut trees at the head of the shallow bay.

Keeping a more westerly course, the Sambaquichaba road passes to the north of the Central Knoll until it reaches a plantation of coco-nuts and cassava, where is a mill for grinding the latter. Here branches off a road still in process of construction, which leads away to the south coast at Leão Bay, which can also be reached *viâ* Suéste by a road also under construction from that place. Half a mile or less beyond the cassava mill, a rough bridle track leads off to the Sapate, and the road turns slightly to the northward and strikes the coast at Sambaquichaba. Here is another settlement, being by interpretation the "plain of the Quichaba," an endemic tree.

In a sheltered cove near the Twins—rocks of black columnar basalt—is a charming orchard of oranges, and limes, and figs. Here, too, grow the best melons on the island, and the members of the expedition will long cherish pleasant memories of that pleasant place, and the unlimited green coco-nuts and fruit that always seemed to await us there by the profuse hospitality of the intendant.

The Sapate track gradually ascends the cultivable slope until it reaches the woods, and this part of the island will require special mention. Meanwhile there is much to be said about the plain. Descending from the town hills, the Peak stands out clear against the

northern sky. Its summit is not hopelessly inaccessible, but the climb would be very dangerous. It is a huge mass of columnar phonolite, with a talus of *débris* around it, in shape not unlike a church with a tower. About the centre of the plain near the cassava mill, rises a round mass of phonolite, unnamed, which I call the Central Knoll. On the south coast, like bastions, stand two other phonolite masses, with a ridge of basalt between them, steep on its seaward side, but sloping gradually landwards. The more easterly is of considerable height, and is the place from whence the steamship *Giquiã* is signalled, whence we called it Look-out Hill. The other is lower, but more rocky, and from the dense mass of cactus and other plants on the top, we called Tangle Rock, and the space between Tangle Bay.

The islands of the south coast, with the exception of the minute I. Jones, are also phonolite. Tobacco Point is basaltic, and Morro Branco, in Leão Bay, altered phonolite. There are raised beaches of reef rock on Tobacco Point and to the east of Look-out Hill. The broadest and least elevated part of the island lies between Suéste and Sambaquichaba, and westwards of Leão Bay the coast becomes rather rocky. A track leads to some huts in a sort of theatre of cliffs, where lies the lake, a good-sized pond with some very welcome aquatic things in it. The cliffs seem formed of horizontal layers of basalt, and the space below them is very rough with rocks and tangled scrub. Beyond, at Pedras Pretas, there is an awful bit of travelling over the ruins of the cliff, and there further progress along the shore seems impracticable. A steep slope of what is apparently scoria hardened into rock, and still preserving the angle of rest at which it fell, takes one to the summit. The slope of the hill is the slope of the beds, and the hard lumps slide from under the feet where the weather has detached them from the main mass. The top is basalt, which clearly overlies scoria, and there are better instances still on the far side near the cleft of C. Placelliere. This seems to account for the hole in the wall, as the scoria rock, though hard enough, is not so hard as the basalt. On the top of these hills lie what remains of the ancient forests of the island, large trees of the Burra, a Euphorbiaceous plant with its acrid milk, and here were more than one of the rarer plants which we secured. The regular track gives a better access than the coast, but we scrambled over the rocks for their great geological interest. A hut with some bananas and a friendly convict was one of our chief halting places, and there were ways down to the north coast of which we availed ourselves. This is also very rugged at this end of the island.

The brooks, such as they are, need a word of mention. The largest falls into the sea at Suéste, and has mangroves growing on the banks where it nears the salt water. Another runs into Cotton-tree Bay, and another into Sponge Bay. These are the principal ones of the south side of the island. On the north, perhaps the most important are the one

which flows in at the landing, and has usually a good supply, and the one that drains the country west of the Peak. Other smaller ones trickle over the Sapate cliffs. For the most part, the running water is not very good, though tolerable. It is slightly brackish and even high in the centre of the island. The sides of the creek give one the idea of a tidal swamp. The meadow in Cotton-tree Bay is very saline.

Before quitting the geological characters of the island I venture to hazard the following observations with regard to its structure and possible history.* Though undoubtedly volcanic in origin, the date at which it was in any way active must be exceedingly remote. No hot springs, or any trace of them occur, no earthquakes or tidal waves are felt. No site of a crater can be pointed to with certainty, and indeed any attempt to reconstruct its pristine shape from the attenuated remains that are left us must be undertaken with extreme diffidence. Still perhaps I am justified in this attempt to collate some of our notes on the physical features of the place.

As the island is surrounded by deep sea, and as nothing volcanic occurs, as far as I am aware, on the coast of Brazil in its neighbourhood, I am inclined to think that it marks the site of an isolated vent. The number of species of plants, &c., peculiar to the island seems also to point to this, or at any rate to the extreme remoteness of any connection with other land. But there is at least one thing which may throw some light on this matter.

All round the island, though interrupted in places, especially on the northern coast, there is a sort of reef formation laid bare at low water, and closely resembling the Recife of Pernambuco. At certain points a very similar rock is found at considerable heights above the sea. On Rat Island this reef attains no great elevation. It rests upon a beach of rounded boulders near the landing, which may be seen underlying it. Boobie Island and Egg Island also have it, and there are traces of it at the summit of Platform Island. On basalt in Cotton-tree Bay, close by Look-out Hill, it occurs at a yet greater height, and again on Tobacco Point and Jones Island it also occurs above high-water mark. Raised beaches, therefore, seem only to exist on basalt, and in close connection with a phonolite peak. The first series groups itself around St. Michael's Mount. The second is almost on the actual junction of the two rocks, and reaches 300 feet above the sea after being met with up the whole slope. The third is at no great distance from Tangle Rocks, and lies directly between the phonolite islands of Aux Gouletes and Des Frigates. Morro Branco and the Peak are free from it, and the Central Knoll is excluded *ipso situ*, and Les Clochers stands by itself.

The Peak is also an exception to another rule, which seems to hold

* For this section the writer is alone responsible, and he wishes the hypothesis to be regarded as purely tentative, but he inserts it for what it is worth. Mr. Ridley, who has revised this paper, is somewhat inclined to dissent from it.

good in other cases: that where the phonolite and the basalt join, both seem more or less disorganised in structure, notably the phonolite, which seems decomposed into a whitish stone, not unlike some specimens of silica I have found in hot springs. Sometimes, as in one fine specimen now in the British Museum, the rock has softened into concentric layers of clay surrounding a nodule. This was an oxidised basalt ball, not phonolite. But the junction of the rocks near the Peak is much hidden by humus, and is less easy of investigation. Morro Branco, which gets its name from the circumstance, is the most conspicuous instance, but some of the neighbourhood of Tangle Rock is very curious.

I would also point out that the phonolite peaks all rise either from the sea or from low-lying parts of the island, that their sides are very abrupt, and that there is a great tendency to isolation. Mount S. Michael lies in a sort of hollow, between the basalt of Rat Island and the mass of the Town Hills and the East Hills, and the whole of the other peaks between the East Hills and the Sapate Hills. To Morro Branco some exception may be made as possibly belonging, with Islands du Maire and Aux Gouletes, to a different system, but otherwise the rule holds. It must also be noted that the scoria (?) and dykes only occur on the east of the East Hills and on the west of the Sapate.

Turning to the general contour of the islands I observe the following peculiarities:—First, that the axis of greatest length lies at right angles to the prevailing winds, to wit, north-east to south-west, while the south-east trades blow pretty constantly; also that the south-east side is the most indented and precipitous.

The difference is but slight, and perchance I was only led to notice it by having seen something analogous on the windward sides of some of the Sandwich Islands. The “rocky patch” marked on the chart, and the two rocks called the “Brothers” (which latter seem to be reef rock), seem, however, to point to denudation from the south-east.

Denudation, however, is at the present time very slow. The seaward faces of the island are so rocky that little can happen there except the gradual wear of the boulders of the shore and the occasional fall of a piece of weather-worn cliff. The soil of the interior is not carried down by the streams to any extent, and the growth of reef rock must be another preserving influence.

But the denudation in past times has evidently been enormous, and the present slow rate of progress helps one to some idea of the immensity of the epoch required. For that solitary peak with its contorted columns was not shot up into the air as it now stands, but must have been formed under vast pressure of superincumbent rock. How much of this has gone, and what was the nature of the rock, must be matters of conjecture. Ocean currents might remove the materials westwards perhaps, as that appears to be the direction of the present current, and the island would slowly dwindle to its present size.

These notes are only the results of observations on the spot, and are written before any account has been issued of the rock specimens brought home from the island by the expedition. These will no doubt settle the relative age of the various minerals, but there is good ground for hoping that the position of the raised beaches will afford some clue to the whereabouts of the volcanic vents, and the points which have given way to subterranean forces in later times.

My suggestion is that the phonolite regions mark the sites of the ancient vents of the volcano, the phonolite itself being the plug which remained fixed during subsequent eruptions of lava. The scoria is all but gone, only remaining where the basalt covers it, but the harder phonolite still remains in its place, and the raised beaches show that beneath it lay the forces which manifested themselves in the last expiring efforts of the volcano.

Turning to the fauna and flora of the island, I enter on the principal work of the expedition. There are no indigenous mammalia, and the "mures quam maximi," of which Amerigo Vespucci speaks, must, if indeed he ever visited the island and saw them, have been extinguished by the rats. The insects introduced are few, and among the reptiles the little house gecko is the only one certainly introduced by man. The other two, an amphisbæna and a lizard, are peculiar to the island, and of the three land-birds two are peculiar and one a species known elsewhere. Three-quarters of the insects taken by the expedition are of species new to science, and a good proportion of the other invertebrates. Of plants there are about 200 species all told, of which about 30 are peculiar to the island. As a very exhaustive account of the natural history will be published shortly by the British Museum, this part of my account must needs be rather short. The problem of the distribution and range of the known species will be very intricate, but South America and the West Indies will claim the majority.

The great interest of the vegetation of Fernando centres in the conflict between the uninvited satellites of man and the aboriginal flora. A ruthless, truceless war is being waged, and the issue is already decided. The invaders have mastered the plain country, and are at present engaged in storming the heights and reducing the sea-shore. The woods have, for the most part, already fallen, partly in process of clearing for cultivation, partly for firewood, and partly by order of the authorities, lest the convicts should make rafts and escape. The only trees of any size left are some aged burras, saved by their poisonous juice, and here and there a native fig. On the rocks the endemics still hold their ground, and on the wind-swept cliffs of the coast, but it is after all a precarious tenure of existence, and we felt, when we found on the East Hills two scrambling bushes of a plant so strange that its very order seems uncertain, that perhaps they were the sole survivors of their race. But it is in the Sapate that the warriors of the invasion do battle. The fire-

wood cutters have still some of the old woods to work in, and here the trees have some chance of recovery. But round the edge of the woods, and over the rocks and stumps, great beans like perennial scarlet-runners (but that their flower is crimson) and climbing cucumbers are smothering everything. Here, when once the poor native shrub is felled, it must abandon hope. Matted climbers, a foot thick in foliage, embrace it, and its life is stifled. Man cannot force his way through them, the best plan is to creep underneath among the stumps and rocks, where progress if slow is at least possible. Even where there is no scrub the beans cover the broken rocks to such a depth that walking is a severe labour, not to mention that such places are also haunted by a particularly virulent variety of *Jatropha urens*, a plant which both pricks and stings. The yellow cucumber (*Momordica Charantia*) will sometimes cover an acre or two; and what with the Leguminosæ which form the bulk of the fodder plants of the island, the amount of botanical rubbish is enormous.

With regard to the native plants, the general type is not striking. Hardly any have flowers of any great beauty, and there is nothing large and succulent such as aroids or Liliacæ. Berry-bearing shrubs, Euphorbiacæ, and a few grasses would include a large section of them, but a new dodder (*Cuscuta*), a new convolvulus (*Ipomœa*), a pretty scented composite, two endemic oxalis (*O. Noronhæ* and a new species), the cactus, the fig (*Ficus Noronhæ*), a *Gonolabus* with its fluffy seeds, much like the Brazilian species, may be selected from other orders.

The littoral fauna is not large, but is very rich in fish. Sponges and corals are met with, and several kinds of sea-urchins and worms. Crabs of great alacrity run about on the rocks, and even leap from one stone to another; and crayfish are also found, and cuttlefish. The beauty of the pools of the reefs is very great; fish of the most gorgeous colours—gold, green, violet, and scarlet—abound. They were readily taken by our dear old guide, Marçal, a convict of seventeen years' standing, who knew the vetch whose root poisoned the waters of the pool, an unsportsman-like proceeding, but very effectual. There are no fresh-water fish, though one of the shore species sometimes finds its way into the lower courses of the brooks.

Of the larger marine animals we saw a few turtle and sundry sharks. A very large ray used to frequent the Peak Bay and cause much disturbance among the small fry. A big *Serranus* or sea-perch was caught nearly four feet long.

There are a limited number of horses and cattle on the island, a few pigs, fowls, &c., some sheep of a very woolless order, and a great many goats. The feed is mostly leguminous plants of a semi-shrubby description, cassias, and vetches, all common Brazilian weeds which thrive luxuriantly wherever there is soil. Their seeds give sustenance to countless rats and mice (the black rat and the common mouse), with which the island is completely overrun.

Of cultivated plants we have enumerated over thirty species, of which, perhaps, the most important are the coco-nut, banana, pumpkin, papaw, cassava, maize, sweet potato, and the black bean. Others, such as fruit trees and flowers, need not be specified; the only thing we heard of as refusing to grow being the pine-apple. Grass does not abound. One species is sown for fodder, but the place of the rest is supplied by Cyperi, &c., of no special economical value.

It only remains to give some account of the convict system, which seems almost unique in its excellence. There are about 1400 convicts on the island out of a population of a little over 2000. The residue is made up out of some 160 soldiers, 400 women and children, and the officials of the Presidio. At the head of the whole is the Director, a Brazilian officer who has earned distinction in the Paraguayan war and in subsequent service under Government, and has received the Order of the Rose and another decoration. Under him is the Adjudante do Presidio, and the chief accountant and the medical officers. The military are quite distinct; they have their quarters in the fort, which, though antiquated, is quite strong enough for all practical purposes, and their duties are mainly sentry duty and ordinary drill. The church is served by a priest, and there is high mass every Sunday at eight a.m., and occasional services at other times, such as festivals, &c., besides the regular daily mass. On Sunday the soldiers attend, and about one-fourth of the convicts, who march down from parade in the square. Each prisoner is supposed to come once a month, and there is daily evening prayer at six p.m. in the square. It consists of a hymn to the Blessed Virgin, and appropriate music, and is a very striking scene. Those living at a distance do not take part in it, nor are they seemingly expected to come to mass, where the numbers seldom exceeded 150.

Great distinctions of privilege exist among the prisoners. The first class have in many cases official posts carrying small salaries, others live by trade, &c., all their time being their own. Our friend Marçal had earned his first class by going to the mainland for help during a mutiny of the soldiers two years ago. Good behaviour brings a very substantial reward, even in admission to the second class. These are allowed to live in different parts of the island. They cultivate small patches of ground, or are picketed in huts round the coast, where they can see if any of their mates contemplate launching a raft for escape. The rest are variously employed; four to six hours a-day is Government time, when they make roads, do odd jobs, fish, clean up the place, catch rats, or otherwise make themselves useful. Clothes are served out twice a year, but the climate is too perfect to require much care in dress, and rations are drawn at the market about every ten days, dried beef, beans, farinha, and tobacco being issued. The classes are distinguished in dress, but no one is prevented from buying anything extra he cares to wear, nor from going about in the remains of an old sack if it pleases

him. Wives and children may join their husbands if they like to, and a school is provided, and the boys are drafted into the army when they reach a sufficient age.

One prisoner was flogged while we were on the island, the offence being a violent assault. It was a solitary case, and we never saw any of the officials carrying any weapon whatever. The discipline of the place requires that no convict shall wear his hat in the great square, nor remain on horseback when he meets the Director, otherwise there are but few restrictions. Indeed, curious though it all may seem to English ears, the type of criminal is different to what it is in England, and a more merciful punishment is only justice. These negroes, Indians, and half-breeds are mostly there for murder, but that only means that where an Englishman might use his fists, they have used a knife. The forgers are a very quiet set, and often rise to posts of trust. Altogether, the convicts with whom we talked were far from being degraded or ruffianly—in fact, in many cases they were quite the reverse. Just complaints may always be brought before the Director, and we often heard little favours granted. The system, in fact, in his able and kindly hands, works excellently, as we had every opportunity of seeing.

And now this paper must close. We returned laden with treasure—not the hoards of Dutch pirates, for which the convicts to a man thought we were in search of, but with more new species than we had the smallest expectation of, and all arrived safely at the Museum.

After the paper,

Mr. SCLATER said he had listened to the paper with great interest. It showed what excellent results might arise from very small beginnings. Two small sums of money were placed at the disposal of two gentlemen for the purpose of exploring the little island. They had carried out their expedition most successfully, and had obtained a rich harvest of results. There were many more unexplored islands scattered about the world, and Mr. Wallace's book on *Island-Faunas* showed how important it was that they should all be explored. He hoped that the success of the expedition to Fernando Noronha would induce other gentlemen to make further researches of a similar character.

Mr. COLIN MACKENZIE said he was one of those who had sighted the island without having the opportunity of visiting it. Every one who went to South America must have noticed that steamers made for the island, because its remarkable peaks were good landmarks. The place had been a bone of contention between different races and nations. When the Dutch endeavoured to establish themselves in Pernambuco, they found that the island was one of the strategical points that they must hold, and they held it even after the abandonment of Pernambuco itself, but they sank into the condition of buccaneers and pirates, and made the island a centre from which they devastated the country north and south. They were driven out by the Portuguese, who were very jealous indeed of permitting any one to investigate the interior. Afterwards, it was turned into a penal colony, and the regulations against landing there became still more strict. Only since the adoption of measures of leniency with respect to convicts had the Brazilian Government felt themselves justified in granting permits for naturalists to explore the interior, so

that until Mr. Ridley and his party went there, nothing was known of the island except the coast-line. It was extremely fortunate that this visit was in time to save the remnants of the native indigenous species, with which the island must formerly have abounded, before they were overrun by those importations which follow civilisation. In Paris, not long ago, a man was brought up on his own confession for robbing his master. He said, "I have robbed him and you ought to condemn me." "Why?" "Because I wish to be sent away." "Where?" "To New Caledonia." "Why?" "Because I have heard from friends of mine who have been sent there that it is a Paradise on earth." From what he (Mr. Mackenzie) had heard, a similar feeling prevailed among the criminal classes in Brazil with regard to Fernando Noronha. He had listened with great pleasure to Mr. Lea's admirable paper, which had so graphically described the island.

The PRESIDENT, in proposing a vote of thanks to Mr. Lea, said that the island was visited by Darwin and by the naturalists in the *Challenger*, but nothing like an exhaustive examination of it had been possible by them. The island, so far as could be judged, was one of the numerous instances of small volcanic islands, isolated from the great continents, which had been gradually raised from the bed of the ocean. The raised beaches apparently indicated this, and the same inference might be drawn from the peculiar forms of animal and vegetable life that still remained there. As Mr. Sclater had said, it was highly important that, before the progress of civilisation extended further, an examination should be made of all such outlying remnants of the ancient world. Apparently in Fernando Noronha there were still some remains of ancient vegetation and animal life, just enough to show what there might have been in past times, and possibly to indicate the degree of connection with the life on the South American continent; but in the absence of anything like definite knowledge, all that he could now say was that probably a good deal of interest would be aroused by the more complete account which Mr. Ridley would give when the final results of the expedition were published.

A Journey up the Cross River, West Africa.

By H. H. JOHNSTON, H.B.M. Consul.*

OLD CALABAR, February 9, 1888.

ON the 5th January last, I started on an expedition up the Cross river, for the purpose of making treaties with the various kings and chiefs along its banks, by which their territories might be brought under British protection. I also wished to settle by my mediation several quarrels which had occurred between the Calabar people and the natives of the Cross river, and between the various tribes which inhabit the countries of Umon, Akukuna, Afikpo, Iko-Morut, and Arun. These quarrels, and the state of intermittent warfare to which they gave rise, had long exercised a prejudicial effect on the trade of the river. I am glad to say I succeeded in both my objects. I have made treaties with Umon (the first country above the Efik, or Old Calabar territory), Akukuna, and Iko-Morut, besides making friends with and distributing British flags to

* Communicated by the Foreign Office.

the people right up to the borders of Atam. I have also settled a long and tiresome palaver between Umon and Calabar, and I have induced the Umon people to renew friendly relations with Akukuna, and Akukuna to make peace with Iko-Morut and resume trading with Arun. I might have made treaties further up the river, but I hesitated as to the advisability of further extending our responsibilities in the interior until Her Majesty's Government have decided on the means of governing the Protectorate of the Oil rivers. Wherever I went up the Cross river the chiefs were ready and even anxious to make treaties placing themselves under Her Majesty's protection, but it was doubtful whether they always understood the obligations they themselves incurred by signing such treaties. And in the case of their infringing any of the clauses of these agreements, I was not sure that it would be convenient, under existing circumstances, for the Government to coerce them into keeping their engagements. Above Iko-Morut, and near Atam, the people are in many places wild and excitable. They are inveterate cannibals, and are continually fighting among themselves. They accorded me a boisterous reception at first. In some cases they began by firing at my canoe (I had to travel up the Cross river in a large canoe, as I could neither hire nor borrow a steam-launch from the merchants or missionaries at Old Calabar). Then they would wade out through the shallows, armed with all kinds of weapons, and compel me to stop. They would nearly sink the canoe in their excitement; but, to do them justice, they never plundered us of the veriest trifle. In one instance I was dragged out of the canoe by a score of cannibals, mounted on the shoulders of the biggest, and carried off at a run to the town, where I was put in a hut with the door open, and had to submit to be stared at for an hour by hundreds of entranced savages. Almost over my head, hanging from the smoke-blackened rafters of the house, was a smoked human ham, and about a hundred skulls were ranged round the upper part of the clay walls in a ghastly frieze. Despite these sinister surroundings, however, as soon as my interpreters rejoined me I entered into friendly conversation with my captors, and we soon got on excellent terms. After an hour's conversation I had completely won them round to a quiet and friendly demeanour, and, finally, the same big savage that had carried me out of the canoe carried me back, to the surprise and relief of my frightened Krooboy. The town gave me a hundred yams and two sheep, and the old chief presented me with a necklace of human knuckle-bones from off his own neck. After leaving the place where this incident occurred (it was called Ededama), the banks of the river were thickly populated, and the people became increasingly turbulent. Although all our enforced interviews (for we were captured and released every few hundred yards) ended in boisterous friendship, yet, to begin with, they were almost undecided as to whether they should not kill and eat us, or, at any rate, eat my Krooboy.

Under these circumstances, I thought it better not to pursue my explorations any farther, but to make a judicious retreat while the natives still doubted how to deal with us. When I turned my canoe round, however, and paddled back past the noisy villages, my retreat seemed to invite some of their inhabitants to give chase, and we underwent some moments of terrible excitement when the canoe would run aground, and hundreds—to our excited fancy it seemed thousands—of yelling savages would attempt to wade across the shallow water and seize us. Even little children armed themselves with matchets and knives, and standing ankle-deep in water shrieked out how they would like to eat us. Fortunately, although there were many guns among the men, they never attempted to fire at us, and it is therefore quite possible they only meant to scare us, either out of fun, or with an idea of driving us from the canoe and leaving our baggage to be plundered. However, we managed to keep out of their clutches, and there was no actual breach of the peace on either side, so that I am glad to think I have left no blood-feuds behind me. It was a great relief when we got back to the friendly and hospitable country of Arun, and thence to Old Calabar; we received nothing but kindness, and were generously supplied with food.

I have made a careful survey of the Cross river as far as I ascended it, and I am preparing a report of my journey. I have also made collections in natural history, which will be forwarded to Kew and the British Museum. The enclosed sketch-map will show the results of my expedition.*

The Kaap Gold-fields of the Transvaal.

By FRED. JEPPE, F.R.G.S.

Map, p. 484.

THE so-called Kaap gold-fields of the Transvaal or South African Republic, as shown by the accompanying portion of my new "Map of the Transvaal and Surrounding Territories," now in process of being compiled, are bounded in the west by the Kaap Plateau, called Godwaan Berg, in the south by a high range of mountains dividing the Kaap Valley from Moodie's gold-fields, in the east by a line drawn from Kamhlubana Peak to Nillmapin's Drift on the Crocodile river, and in the north by the last-mentioned river, from the said drift to a point opposite the Kaap Plateau.

* The boundary between the English and German protectorates has been inserted on the map as shown on the sketch sent by Mr. Johnston, but according to the agreement between the two countries the boundary is stated to follow the right river bank of the Rio del Rey from its mouth to its [unknown] source, thence in a direct line to the "Rapids" in the Cross river.—[Ed. 'Proc. R.G.S.']

The area of this territory, comprising about 800 square miles, is watered by the Kaap river, the principal source of which, named Queen's river, rises in the high mountain range in the south-east of Barberton, while the other two branches of the South and North Kaap river take their rise in the Kaap Plateau, combine into one river in the so-called Golden Valley, close to Eureka City, and join the Crocodile river in about long. $31^{\circ} 25'$ E. and lat. $25^{\circ} 32'$ S. The Crocodile river, named Ingevenja, Umgevenja, or Meguenha by the natives, which forms the northern boundary of the proclaimed gold-field, rises near Great Zuikerboschkop, south-west of Leydenburg, and joins the Komati close to the Lebombo range. It is here where the terminus of the Lourenço Marques Railway will be established on Transvaal territory.

The mountain range in the south, dividing the proclaimed gold-fields from Moodie's territory and Swasiland, forms the watershed between the waters running north towards the Kaap and Crocodile and south towards the Lomati or Komati rivers. The former is an affluent of the latter, and joins the Komati close to the Lebombo range. This mountain range rises in some peaks to an altitude of 7600 feet, and forms a huge branch of the Drakensberg, extending from the Natal border towards the Limpopo, north of Zoutpansberg. The altitude of the Godwaan Berg, which mountain presents a very precipitous face towards the valley to the east, is about 1500 feet above the valley, or 5800 feet above the sea; and the altitude of Barberton, at the foot of Saddleback Hill, is considered about 3000. Numerous small ranges and kopjes intersect the valley in all directions, and a long range of hills skirts the southern banks of the Crocodile river. Towards the north the Mauch Berg attains an altitude of 7200 feet, and the Spitzkop 5600. The highest altitude within the limits of our portion of the map reached by the projected railway is at Stackspruit, where the line ascends the Drakensberg range, 3283 feet; the highest altitude, 5884 feet, is reached at a farm named Bergendaal, a little beyond the left margin of our map. The Lebombo range, forming the boundary between the Portuguese possessions and the Transvaal, is merely a series of low ranges some eight or ten miles in width, and not higher than 900 or 1000 feet at the highest points.

The vegetation in the Kaap Valley is semi-tropical, but not very luxuriant, owing to the want of water. Most of the tributaries of the Kaap river, descending the valley from the surrounding high mountains, carry a great body of water during the rainy season, but they dry up and disappear almost entirely during the winter season. The valleys formed by the spruits or rivulets are lined with bush, very dense in some localities. The African mimosa thorn is the most prominent, but yellow-wood, iron-wood, and other African species are also found, besides a stray palm, cactus, and wild fig in the deeper valleys. The pasture is very rich during the summer months, but during the winter season the

grass is burnt off by the prospector in search of reefs, or by the Boers of the neighbourhood, who formerly came into the valley with their flocks unconscious of the treasures hidden beneath the verdure. The pernicious habit of grass-burning, by which the growth of trees is crippled, if not destroyed, will make itself felt within a short time, as nothing is done by Government to preserve the wood indiscriminately cut down by the gold-mining companies for the consumption of the daily increasing number of steam-engines.

The numerous ruins of old Kaffir kraals scattered all over the valley show that the valley was formerly thickly inhabited by natives. Now there are no tribes to be found, and labour is supplied by the Swasi and Amatonga races living to the south of the fields. There is abundant evidence that the reefs were extensively worked by a white race in ancient times. Mr. Stuart, in his remarkable report on the Lisbon mine,* refers to these old workings in the following terms:—

“The discovery of gold, as far as regards the English, may take date from 1870, but I soon found that the Transvaal must have been extensively worked by the miners of ancient times. I came upon the remains of old workings, showing that centuries ago mining was practised on a most extensive scale, that vast quantities of ore had been worked, and that by engineers of a very high order. I found quarries, tunnels, shafts, adits, the remains of well-made roads, and also pits of ore on the side of these old roads, apparently ready to be put into wagons. This ore was piled with as much regularity as if it had been placed for strict measurement, and it would seem as if these workings had been abandoned precipitately by the miners. I found in one instance that a gallery had been walled up with solid masonry. I could not conjecture the reason for this, but it may have been walled up by the miners themselves, under the impression that their abandonment of the works would be but temporary, and behind it there may possibly exist a continuation of the level. I was not able to remove the wall, as it was on a farm not at that time under your control. The native tribes, so far as I could ascertain by diligent inquiry, knew nothing as to who these ancient miners were, and have no traditions regarding them. I prefer to attribute these workings to the Portuguese, who are historically known to have had many trading possessions, and to have gained much gold in this section in the seventeenth century. My reasons for so attributing these workings is that they were acquainted with the use of gunpowder. But whether even a more ancient people, such as the Phoenicians, or whether the Portuguese did this work, is immaterial; the fact remains, and is open to all who will visit this country, that mining on a very extensive scale was carried on by some nation in the past.”

The climate in the valley is considered unhealthy, particularly in the deep creeks running towards the Kaap river, but the gloomy ex-

* ‘Report on the farm Lisbon,’ by John M. Stuart. Published in April, 1883.

peetations regarding Barberton have been completely falsified. Mr. Mathers, in his admirable work lately published,* says:—

“Many who journeyed to the town to settle, did so prepared to make sacrifices of health if it so could be that they would rapidly make money. Whether they have acquired more of this world's goods or not, it is certain they have gained in bodily health. The fact is that so far from the climate of Barberton being bad, it is exceptionally salubrious. There may be occasional cases of fever in the town, but they have found their beginnings beyond the boundaries of Barberton. These again may or may not be legitimately contracted cases. Men even with cast-iron constitutions could not long with impunity breathe malaria while sleeping in the open at low-lying fever-haunted spots; it is scarcely to be wondered at that men who shatter their frames with drink should sometimes succumb. There is no fever in the town proper, and little or no other sickness. It might have been expected that in the early days of growing Barberton the health of the town would be unsatisfactory, and yet we find that in the seven months ending with last November there were only 120 odd cases in the hospital; of these 107 had been discharged then, while others remained to become convalescent. Deaths in the town are few in number, and those from fever bear a small proportion to those resulting from other diseases or accident. Medical men have little or no work to do. They flocked to the place thinking to coin money out of fever patients; for a livelihood they either flitted, had to become scrip-sellers, or turn their hand to harder toil. There are hardly more than half a hundred graves in the Barberton cemetery, and the grave-digger, finding his occupation unprofitable, threw it up in disgust, and took to digging for gold.”

Game has almost disappeared, frightened by the reports of the dynamite and the prospector's gun, and the Tsetse fly has gone away with the game, save in some parts of the valley. The valley, formerly teaming with all kinds of game, from the elephant to the steinbuck, is now deserted except by a stray leopard in the kloofs, or the lion on the Lebombo flats, where more game is found.

Regarding the geological formation of the Kaap Valley, professional men have not yet formed a decided opinion, or have been careful enough to express themselves in general terms only. Mr. Penning† says that the lowest strata observed in the Kaap Valley consist of a series of soft grey argillaceous shales or slates, so greatly tilted as to be found in some places almost in a vertical position. These beds were originally horizontal, being clay deposited by water; they have since been greatly metamorphosed by heat and pressure of many hundreds of feet of rock accumulated above them. Their being so much broken and tilted out of

* ‘The Gold Fields Revisited,’ by E. P. Mathers, F.R.G.S. Durban, 1887.

† ‘A Guide to the Gold Fields of South Africa,’ by W. H. Penning, F.G.S. Pretoria, 1883.

position is due to plutonic or volcanic action, of which the granite and other eruptive igneous rocks, so plentiful in the valley, afford ample evidence. Now, Prof. J. A. Phillips, the great authority upon these matters, says, in his *Elements of Metallurgy*, p. 684:—"Native gold, *in situ*, is most frequently met with in quartz veins intersecting metamorphic rocks; and the metamorphic rocks enclosing gold veins are mostly chloritic, talcose, and argillaceous slates—auriferous veins also occur in granite. These *slates*, traversed by dykes of granite, are said to form the surface rocks in Swasiland and along the border of the Transvaal, which follows the southern boundary of the Kaap Valley. If this be so, the region offers a tempting field to prospectors, not only for alluvial gold, but also for lodes containing gold and other valuable metals.

"Above the slates is a series of hard shale sandstones and conglomerates, traversed by dykes of igneous origin. These beds are also tilted at various angles, and are broken or *faulted* in every direction; they are highly metamorphosed, especially near the trap dykes, where the sandstones are altered into quartzite. The beds of these series are exposed in the high krantz described, and extend beyond it over a good part of the Kaap Valley. The Krantz (Kaap Plateau) appears to have had its origin in a big N and S fault, with a downthrow to the east; its line being also more or less followed by an extensive dyke of greenstone. There are numerous quartz reefs in these rocks, for the most part vertical, or nearly so, and some of them have been proved auriferous.

"In certain portions of the Godwaan Plateau, and near its eastern edge, are some remnants of what must have been formerly a very extensive deposit of sandstone, probably of the age of the South African Coal Measures. These, when broken, are seen to be white crystalline sandstones, grits and conglomerates, which weather to a grey colour, and now, broken up into large lumps, form the boulders beneath which the gold nuggets were found. The sandstones also are traversed by veins of quartz, in some places highly ferruginous, and these, or some of these, have been proved to contain gold; but up to the present time (1883) very little work has been done upon the reefs in either of the formations described. The occurrence of these groups of rocks, which are known to enclose auriferous veins elsewhere, and the prevalence of quartz veins and trap-dykes running in various directions, render the geology of this district important to the question under consideration. The first series of rocks described are doubtless of lower or older Palæozoic age; the second probably belong to the newest rocks of that period, or the oldest of the Upper Palæozoic; the third are, in the writer's opinion, certainly of that age, Upper Palæozoic, and belong to the Carboniferous series."

Regarding the Barberton formation Dr. Schenck, a German geologist, who lately visited the Kaap and all the other gold-fields, says that the Barberton formation consists of very old, and in most instances high

metamorphosed rocks, composed of slate and sandstone, with interposed eruptive rocks of greenstones (diorite, serpentine, &c.). These rocks are highly tilted, dipping invariably at great angles, often perpendicular, and run from east to west. In this formation the gold-bearing veins or reefs are situated, and these with few exceptions run in the same direction (this is, for instance, the case with the reefs at Moodie's and with the Shebacte), nearly always accompanying the eruptive rocks. The gold, in the doctor's opinion, came from the interior of the earth with the eruptive rocks to the surface, and was thereafter concentrated in these reefs, which consist of quartz, and often contain iron along with the gold. This formation probably corresponds in age with the Silurian formation of Europe, and is found also in Swasiland, Zoutpansberg, and the recently discovered gold-fields of the Tugela. There is no young formation overlying these rocks at Barberton, but in the Drakensberg and the Witwatersrand, a younger formation lies unconformably over the older rocks. This is of Devonian age. The Barberton formation, he is inclined to think, proceeds beneath this formation in a westerly direction to Witwatersrand, and thence to Bechuanaland.

A German writer, describing the gold-fields,* says that the formation embedded in the reefs consists chiefly of slate running horizontal with the reef, and being very hardened, causes great trouble to the miners, who call it *blue bar*. He says further, while all reefs as a rule run from west to east, auriferous veins found in reefs running from north to south form a peculiarity of the Sheba Mountain, which appears to be the knotpoint of various rich quartz veins. The richest of these are the so-called Golden Quarry, showing rich veins on the surface, and requiring no shaft sinking, the reef being worked from the surface (Tagbau).

A brief outline of the discovery of the Kaap gold-fields will be sufficient for the purposes of this paper.

Mauch, on his trip from Delagoa Bay to Lydenburg in 1870, found traces of gold in the Drakensberg ranges traversed by him, but an attack of fever contracted at Delagoa Bay prevented closer investigation.

About the same time, in August 1870, J. Britton discovered auriferous reefs near Marabastad, and proceeding from there to Lydenburg, found alluvial gold in the neighbourhood of Spitzkop, for which in March 1871 he, together with Thomas McLaughlan and Jas. Sutherland, claimed the reward promised by law of 31st January, 1871, to the first discoverer of gold. The first company, the Lydenburg Gold Prospecting Company, was established in March 1871 for the purpose of prospecting in the district of Zoutpansberg and Lydenburg. In 1872 Mr. C. F. Osborne, in an exploring expedition, discovered auriferous reefs in the Komati River valley between the present territory of Moodie's Gold Mining and

* 'Die Kaap Gold Fields in Transvaal,' by P. Emmerich, in Sheba Range. Published in Petermann's 'Mittheilungen,' 1887. Heft 5.

Exploration Company and the present Komati gold-fields, but he did not proceed further north towards Barberton.

In the meantime digging operations were carried on at Eersteling, near Marabastad, and in the district of Lydenburg, but it was not before the 14th May, 1873, that the gold-fields in the ward Ohrigstad river were proclaimed and set open as a payable gold-field. Spitzkop, Mac Mac, on the farm Geelhoutboom, and Pilgrim's Rest, on the farm Poniskrantz, became the chief centres of the New Caledonia gold-fields. Two banks were established, hotels, canteens, and stores were built, and the digging population increased to about 900 men, scattered over a distance of six miles along the creek. There was not much reef-mining; alluvial was principally prospected for and worked, but this was found from the bed of the creek to the very top of the high ridge facing the creek. The largest nuggets, weighing 119, 123, and 215 ounces, were found in 1875, the 123-ounce nugget 30 feet below the surface at the head of the creek. The total quantity of gold found and exported from these fields cannot be ascertained. The official returns of gold export through Natal and the Cape ports only represent a small portion of the gold obtained exported by the banks.

But the mere fact of gold being found in large nuggets proved to the experienced digger that the ground was "patchy," and that no regular "lead" existed. The digging population gradually fell off and dwindled down to a small community; then the Secocoeni war deprived the diggers of labour, and they had to exchange the gun for the spade. A few diggers held on, and met with a fair measure of success; many left the country in disgust, but some with handsome fortunes, the proceeds of years of hard toil, or the proceeds awarded them by the companies which appropriated their claims.

During British rule, from 1877 to 1881, there is no record of any progress made in gold-mining, but as soon as the country was given back to the Boers gold-mining entered a new era, what may be termed the concession era. The proclamation of the Ohrigstad river ward was withdrawn, and concessions granted to the owners of the soil, giving them the free and undisturbed right to all minerals formerly claimed by the State. Many of these concessions lapsed by reason of non-payment of the subsidy; others had to be bought back at high prices when the Government wished to proclaim the ground as a public gold-field.

The progress the Kaap gold-fields have made up to the time the reefs were discovered at Witwatersrand is most remarkable. The list of gold-mining companies now established at the Kaap gold-fields, published by the Barberton Chamber of Mines, shows the number of eighty companies established in the proclaimed Kaap gold-fields, including sixteen on Moodie's ground, with a total capital of 3,570,500*l.*, of which upwards of one-third is paid up.

Regarding the township of Barberton Mr. Mathers says:—"Three

years ago Barberton had no existence. It was as destitute of evidences of civilisation as when the now migrated lion and zebra, elephant and tiger, roamed undisturbed in the mountain solitudes now peopled by its energetic inhabitants. At that time prospecting parties left Moodie's to explore the locality. A member of one of these, Mr. Graham Barber, a relative of that esteemed Natal colonist, Colonel Bowker, discovered in a deep gorge the reef which gives the town its name. Barber's reef pinched out, and Mr. Rimer's battery, which was erected to crush the stone of the adjoining Umvoti reef, is now grinding out gold near the Sheba Company's property. A few more finds were made, and some tents went up on the spot. As time wore on these gave place to Kaffir huts and grass and reed houses, and the population, which gathered slowly at first, received large additions when the exciting news of the discovery of the famed Sheba spread throughout South Africa. In July of last year the town was composed of thirty houses of wood and iron, and as many mud and thatch dwellings, together with the primitive structures I have just named. To-day Barberton is a town of about 4000 inhabitants, and is a financial and trading centre for a population of another 4000.

"The town proper has a circumference of about a mile, but beyond this there are many dwelling-houses and other buildings dotted at irregular intervals over a large area. Rising ridges branch out from each end of the town, and along these spurs some very commodious and even elegant residences have been erected. One of the several good buildings which catch the eye is an imposing two-storied red-brick pile in the market square, put up by Messrs. Lewis and Marks. Among the other buildings of importance may be ranked the two exchanges, the new club—as comfortable as any in South Africa—substantial places of public worship, some good hotels, a theatre, two music-halls, and canteens innumerable, four banks, a hospital, Government offices, &c."

The gold-fields are approached by three routes, viz. *viâ* Delagoa Bay, Natal, and *viâ* Capetown or Port Elizabeth, Kimberley and Pretoria, the first-mentioned being the shortest, owing to the close proximity of Delagoa Bay. On the authority of an old digger, J. W. Barrington, this route is only safe from 1st June to the last of August. The reports regarding the unhealthiness of Delagoa Bay and the surrounding country are, however, much exaggerated. Sir Thomas Tancred, the contractor for the railway from Lourenço Marques to the Komati, declared that of his large gangs employed on the line throughout the whole of the contract time, June to December, the white lives lost on the line did not exceed seven, and those deaths were not all from fever; drink and accident being more often the cause. As for himself, he declared he had enjoyed good health and had always been occupied; where a gang of all sorts and conditions of men had to be kept together and advantageously worked in a place like the evil-reputed flats of Lourenço

Marques, it required special attention to keep them at it, overcome fears, and avoid panic." *

The distance from Lourenço Marques to Barberton, which has to be travelled on foot, with native runners carrying luggage, is about 150 miles, which distance is now shortened by 42 miles to Movini station, the present goods terminus of the Lourenço Marques Railway, accessible to traffic, while the station on the bank of the Komati, to which the railway was opened, is 10 miles further on, but not accessible to wagons.

The second route through Natal is 472 miles, of which 187 miles are travelled by rail to Ladysmith, and the rest by post-cart or coach in five days. This route goes by way of Newcastle, Ermelo, and Lake Chrissie. There are some other routes used by transport-riders through Gregtown, Zululand, and New Scotland, said to be much shorter.

The distance from Cape Town via Kimberley and Pretoria is about 1200 miles, of which 647 are travelled by rail to Kimberley, and the rest in comfortable American coaches in five days.

The railway from Lourenço Marques to the Lebombo was opened officially on the 14th December, 1887, but only as far as the Komati, a distance of 52 miles. The line is to be carried 9 kil. or 5 miles further through the Komati Poost to this side of the Lombobo, where the terminus is to be on Transvaal territory. As the boundary line runs along the highest ridge of the Lebombo, where no station can be established, the terminus must necessarily be made on Transvaal soil. From here the line is to be made by the Netherland South African Company, which obtained the concessions granted to some parties in Holland in May 1885. The distance from the boundary to Pretoria, as surveyed by Col. Machado, R.E., is 470 kil. or 292 miles, making the total distance from Lourenço Marques to Pretoria 561 kil. or about 350 miles. The first section to Nilspruit, 120 kil. or 74½ miles, is soon to be commenced, unless the direction of the line is altered, and brought nearer to Barberton through the Kaap Valley.

In the meantime Natal is pushing on the extension of the line from Ladysmith towards Newcastle, and the Cape Government are desirous of carrying a line from their border through the Orange Free State to the Vaal river.

* Report of the Special Correspondent to the *Natal Advertiser* at the opening of the Delagoa Bay Railway, N.A., 19th December, 1887.

GEOGRAPHICAL NOTES.

The Geographical Lectureship at Cambridge.—The candidate appointed to fill the new chair of geography at the University of Cambridge is Dr. F. H. H. Guillemard, M.A., M.D. (Cantab.), whose high qualifications for the post are displayed in his recently published work, 'The Cruise of the *Marchesa* to Kamschatka and New Guinea, &c.' The selection was made by a joint committee of the Senate of the University and the Council of the Royal Geographical Society, which met at Cambridge on the 8th ult.

International Congress of Geography at Paris.—The Geographical Society of France have decided to avail themselves of the Universal Exhibition at Paris, next year, by convening an International Congress of the Geographical Sciences, to meet in the month of August. There will be two classes of members, subscribing respectively 40 and 20 francs, and each member will be entitled to receive a copy of the publications of the Congress, and have a vote on the questions discussed at the meetings. Each Society represented at the Congress will be invited to submit a report on the voyages, explorations, and publications which have most contributed, in the country to which it belongs, to the progress of geography during the last hundred years; the combined reports will afterwards be published with the names of their authors.

Results of Kund and Tappenbeck's Cameroons Expedition.—In a communication which appears in the first number of the 'Mitteilungen aus dem deutschen Schutzgebiet' on the recent expedition under Lieuts. Kund and Tappenbeck, the following information is given as to the geographical results of the expedition. (1) The upper courses of the rivers which discharge on the coast are found above the cataract region:—the Beundo river, which discharges at Little Batanga, is in the interior known as the Njong or Nlong; also the river called by the Batanga coast natives the Great Njong, and which discharges at Malimba by the Borea and Bornu mouths, and into the Cameroons river by the Quaqua mouth. Both rivers have a second cataract region in the interior, which in the case of the former is separated from the lower cataracts by a long stretch of navigable water. A profile which accompanies the report shows a coast plain about 70 feet above sea-level, succeeded by a sharp slope rising to a height of 3000 to 4000 feet (the Crystal Mountains), beyond which the country falls gently to the West African plateau, about 2300 feet above sea-level. (2) The water-parting between the rivers which flow into the Cameroons region, and those further west, which flow into the Congo basin, does not lie near the Cameroons coast, as has hitherto been believed. Thus there is no likelihood of finding a practicable water-way to the Congo basin. (3) The water-parting

between the left tributaries of the Binué and the rivers which flow into the German Cameroons region also lies far in the interior; it can be reached much sooner from the Binué than from the Cameroons. The Great Njong or Zannaga no doubt carries off the water of a great river region. (4) The racial parting between the Sudan negroes and the Bantu negroes does not lie in the direction of Adamawa, but runs in a southerly direction, and is formed by the Zannaga river, and lies about 145 miles from the coast. The limit of Mahomedan influence reaches much further south in the African interior than has hitherto been thought. (5) Volcanic formations are not found as far as the Zannaga river, nor in the mountains immediately to the north of it.

Dr. Meyer's Ascent of Kilimanjaro.—Dr. H. Meyer, in a communication to the 'Mittheilungen' of the Austro-German Alpine Club makes some important corrections in the preliminary account of his ascent of Mount Kilimanjaro (see 'Proceedings,' January 1888, p. 34). After verifying and correcting his barometrical observations, he admits that Kenton's height of 18,700 feet is more accurate than that originally given by himself, 19,850 feet. He has established the fact that his ascent stopped at 17,880 feet. He then refers to the dense mist which prevented him from seeing beyond a wall of inaccessible ice, 130 feet high, which his first account indicated as being the terminal point of the peak. It results from these admissions that Dr. Meyer did not reach to within 820 feet of the summit of Kilimanjaro, which therefore still remains unconquered.

Benguella and Mossamedes.—Mr. E. W. Parsoné, one of our Fellows, visited these two southern ports of Angola last March, in the course of his duties in connection with the southern lines of the West African Telegraph Company. From his report we extract the following interesting items of geographical information:—Mossamedes is situated in S. lat. $15^{\circ} 12' 30''$ at a distance of 385 geographical miles from S. Paulo de Loanda. Approaching the town from the north, the coast presents a rugged and barren appearance, the cliffs rising immediately from the beach to a height of from 300 to 400 feet, their summit extending as a tableland as far as the eye can reach. Some ten miles to the north of the port a remarkable break occurs in the cliff which opens out an extent of valley with some vegetation and low-growing trees. This is the valley of the river Giraul, which for many years has been quite dry at its mouth; in the interior, occasional pools are found in its bed, and a stream is sometimes formed after heavy rains, the water, however, never reaches the coast on the surface, and no doubt finds an exit subterraneously to discharge itself into the sea. It is a curious fact, notwithstanding, and one worthy of note, that an old anchor with heavy wooden stock has been found some 20 miles up this river, embedded in the ancient channel, which leads to the belief that at some past date this river was navigable for a

considerable distance from the sea. The northern point of Mossamedes Bay is Giraul Point, or "Fine Point," on which there is a light and signal station. This is a remarkable promontory which appears to terminate the high cliffs on this part of the coast, and the stone of which it is composed has the appearance of rapid decay. On passing Giraul Point, a magnificent bay is gradually opened to view, with a fertile valley, in which thousands of cattle are bred, running down to its centre, and the picturesque town of Mossamedes in its south-east arm. The southern boundary of the bay, Noronha Point, again presents signs of decayed sandstone, but the bay itself has a clean beach of good sand. With the exception of Loanda this is the finest harbour on the west coast of Africa, and Loanda even suffers in comparison, for Mossamedes is larger, with better depth of water, permitting ships to come closer to the town. There is some talk of building a dry dock and making it the naval station of the coast; in any case, the place is bound to become of leading importance if any steps are taken to open up the south of Angola on a larger scale than has been attempted up to the present. The town of Mossamedes, though not large, is regularly laid out in streets and roads of well-built houses, constructed of brick or stone. Of the public buildings, the new palace or Government-house is the most prominent, and presents a remarkably fine stone edifice, built on the elevated ground between the Cathedral and the Fort. With the exception of the Bero Valley, the surrounding country is destitute of vegetation, but the climate is remarkably healthy and invigorating, the trade with the interior has been much handicapped up to the present by the want of roads and carriers. Notwithstanding these drawbacks, however, the imports and exports are able to show the following figures for the past year, 1887:—Imports, 48,046*l.*; exports, 17,521*l.* 10*s.* 6*d.*; transit, 8000*l.*: total, 73,567*l.* 10*s.* 6*d.* The imports consist of general merchandise; the exports principally of cotton, rubber, dried fish, cattle, and a little ivory. The future development of this district depends much on the "colonies" or inland settlements of which his Excellency the Governor speaks in the most encouraging manner. Three of these settlements are already in full working order; on the high tableland, which has a mean altitude of from 1500 to 2000 feet at a distance from the coast of from 90 to 150 miles, the most approximate and longest established of these is Sa da Bandeira, and further on Huilla and S. Janeiro. The country in their district is abundantly irrigated by fine rivers and streams, and is described as an open country of the most fertile and healthy character; the settlers are happy and contented so far as their existence goes, and only fret at their helpless condition in not being able to find a way out or a market for their abundant agricultural wealth of every description. This is well understood when it is considered a porter from Sa da Bandeira costs half-a-guinea with a load of from 50 to 60 lbs., and takes at least a week to do the journey.

The fact is that only the most valuable of African produce, such as ivory and the best rubber, will bear the expense of manual transport.

Benguella is in lat. $12^{\circ} 31'$ S., and distant from Loanda 224 geographical miles. The bay or roadstead may be said to extend from Cabot's Point on the north to S. Felipe's Bonnet on the south, the latter headland having a lighthouse. The anchorage and landing-stage are to the north-east between these two points. The foreshore is occupied by the fort, the new palace or Government-house, the Custom-house, and the old palace. The town of Benguella lies about half-a-mile back from the beach. The roads, which are very well constructed, form broad avenues, generally planted with trees. Some of the merchants keep their carriages or buggies, and here, for the first time in Africa, I saw the bicycle in practical operation. The town presents a somewhat straggling appearance, from the fact that the principal houses are built in their own grounds or have gardens attached to them, thus occupying a great space and making the place look quite suburban; moreover, Benguella is not really the commercial centre of this district. The agents of the different commercial houses have their residences and stores here, and attend to the shipping, &c., but the trade with the interior is nearly all done at Catumbella, a place about 20 miles in the interior, where the commercial houses have their headquarters. The places are connected by telephone, and I found this instrument in general use in the town. Benguella is without doubt the most important commercial place on this part of the African coast after Loanda, and the following figures speak for themselves:—Imports (1887), 141,917*l.* 0*s.* 5*d.*; exports (1887), 126,481*l.* 6*s.* 2*d.*: total, 268,398*l.* 6*s.* 7*d.* The imports consist of general merchandise; the exports, of first-class rubber, ivory, skins, and coffee. The districts inland from Benguella, like those further south, are of great promise; a scheme is already on foot for opening them out by means of railway communication, and the preliminary survey has been made. The places proposed to be connected are Benguella and Caconda, eight days' march, from which latter place branch lines are to run north and south to Bihé, eighteen days' march, and Limbiques, ten days' march, from Caconda. A day's march may be calculated as 15 English miles. These places are situated on the highlands of the comparatively near interior and are said to offer all the necessary qualifications for colonisation, if only means of communication were established; they are remarkably fertile, healthy, and adapted for cattle-breeding, and hold out promise of mineral wealth. During the last few months much attention has been paid and stimulus given to the rubber trade in the Benguella district, arising from the introduction by the natives of a new class of the gum which has sold at very high prices in the Lisbon market. I have examined this gum, and it appears to be as nearly as possible quite pure. Like other African rubber, it is of two qualities, first and second, or that extracted from the plant and that which is extracted from the root. The former, up till

quite lately, held the best place in the market; but owing to some special qualities, which it has been discovered the root-gum possesses, the latter now commands the better price. Formerly the caravans took eight to nine months to fetch their loads, which consisted of ordinary African rubber, collected from the forest trees; now the troops are back in three months with this superior article in greater abundance. There are grounds for supposing that this new produce is not collected from the trees, as the natives could not go to the forests and return in the time, but that some shrub or bush which yields the gum has been discovered at a much shorter distance. Full information is expected before long, together with specimens of the plants themselves. Evidently the matter is of great importance, as if the surmise be correct that the plant is of quick growth, it would likely be a most valuable addition to the agricultural industries of Africa and other places.

Exploration in the Galla Country.—M. Jules Borelli, the French traveller who accompanied M. Rimbaud last year on his interesting journey from Antotto to Harar,* is engaged in exploring the country to the south-west of Shoa. The Paris Geographical Society has received through M. Ant. d'Abbadie a letter from him giving some of the geographical results accruing from his journey from Antotto to Jiren, which is situated in $7^{\circ} 42'$ N. lat., and $34^{\circ} 35'$ E. long. Among these results is the discovery of the sources of the river Hawash, which lie at the foot of Mount Ifata at the extremity of the Meca range, and not near Mount Dandi, as hitherto supposed. On the summit of the latter peak the traveller found a double lake resembling in shape the figure 8, which is of considerable extent and depth; an affluent of the Gudar, and thus of the Abbay, issues from this lake. He also discovered a deep lake at the bottom of the immense crater mountain known as Mount Harro; the surroundings of this sheet of water are described by the traveller as of incomparable beauty. From this lake, which is named by the natives Wancit, a stream issues and joins the Walga, the source of the latter river being in the summit of Mount Harro. At the time of writing (January 8th, 1888) M. Borelli was on the eve of departure from Jiren on a further journey of a month or six weeks. His intentions were to proceed over Mount May Gudo, lying to the south-west of Jiren, into the country of Callalaka, and thence to Mount Kaffaria, from which point he would be able to survey the country of Kullo.—Dr. Traversi, the Italian explorer, to whose travels in the vicinity of the Upper Hawash we have before alluded,† made in June 1887 an excursion into the mountainous region of Urbaragh, lying to the east of the district now being explored by M. Borelli. The chief result of this last journey of Dr. Traversi is to throw light on the problem of the hydrographical systems of the Somali and Galla territories. From the

* 'R.G.S. Proceedings,' 1888, p. 39.

† Ibid., 1887, p. 627.

summit of Mount Gafat he was able to confirm his previous observations made near the Suai lake, with reference to the three lakes above mentioned, and their interconnection.

The effect of Cultivation on the Climate of Bussorah.—In his Annual Report (No. 348) for last year our Consul at Bussorah writes as follows with regard to the climate of the place. "With the substitution of date and wheat cultivation for that of rice in the country around Bussorah, a remarkable improvement in the climate has taken place. The malarious fever, to which Bussorah gave its name, is now comparatively rare, and the sallow complexions and suffering looks which were universal some years ago are no longer seen. The north-west wind, which prevails in the hot weather, is not, as formerly, moist and clammy, but dry and hot. The month of September, when the marsh formed yearly by the overflow of the Euphrates to the west of Bussorah is drying up, is still the least healthy season. July and August are intensely hot, and December and January cold. The rest of the year resembles the spring and summer of Southern Europe." The trade of Bussorah for 1887 is reported to show a general improvement. The total value of the exports for 1887 was 973,761*l*. Dates and wool formed the principal items and amounted to 641,061*l*. Owing to a deficient rainfall and to the ravages of locusts in the interior, there was not the usual surplus quantity of wheat for exportation. The value of the imports was 511,022*l*. The population of the town of Bussorah and its environs is stated by the local authorities to be 40,000, divided as follows:—Jews 1000, Christians 400, Persians 3000, Arabs 35,600.

Survey Work in Burma, 1887-8.—Major Hobday reports of the operations in Upper Burma that, during the season of 1887-8, the whole of the Yaw country has been surveyed by surveyors attached to the various columns converging on Gangaw. On the north a connection has been made with the work executed by Colonel Woodthorpe's party last year in the Kubo valley. A good deal of the geography of the Schwele river and the Mohlaing district has also been obtained. The extent of surveying that has been done by the surveyors who accompanied the column from Bhamo to Mogaung and thence by the Jade Mines and Endawgyi Lake to Katha on the Irawadi is not yet known, as reports have not yet been received. In the Southern Shan States a party under Lieut. Jackson, R.E., has carried on survey operations in continuation of last year's work from Fort Stedman to Pekon in the Saga valley, thence *viâ* Maukme and Moné to Maingpan and the Salween river, where the Siamese Mission under Mr. Archer was met. Returning to Moné, they carried the survey through Legya and Bansan to Maing-ye. In the Northern Shan States a sub-surveyor has carried surveys from Thibaw to Namsan and across the Myit-nga or Namtu river to Theinni on the Salween, and thence *viâ* Mang-yaw to Manse

and Maing-ye, thus effecting a junction with Lieut. Jackson's work. Major Hobday himself has extended the triangulation from Kyan Nyat to Bhamo, of which the position is thus determined, and a basis provided for the surveys in the direction of Mogaung. It was hoped that the triangulation executed by this party would be connected during this season with that of the surveys in Lower Burma. In addition to the work done by the members of the Department, many reconnaissances have been executed by regimental and other military officers, and the results given to Major Hobday for incorporation in his sheets.

The Population and Trade of Java.—According to the Annual Consular Report for 1887, the population of Java and Madura for the years 1884 and 1886 was as follows (excluding the army and navy):—

	1884.	1886.	Increase.
European	37,680	40,046	2,366
Natives	20,665,510	21,716,177	1,050,667
Chinese	214,470	225,573	11,103
Arabs	11,229	12,696	1,467
Other foreign Orientals ..	2,765	2,767	2
Total	20,931,654	21,997,259	1,065,605

This table shows an annual increase in the population of 532,802, or over $2\frac{1}{2}$ per cent. As regards the trade of the island, the figures are satisfactory. The export of sugar in 1886 was 364,036 tons. The yield of coffee was poor, but there was an abundant rice harvest, and the exports of the latter product amounted to 76,000 tons, against 46,000 tons in 1886. Both the quality and out-turn of the tobacco crop exhibited a marked improvement on that of the previous year. The cultivation of cinchona, the introduction of which into the island is of comparatively recent date, appears to be progressing satisfactorily. The exports of this product are steadily increasing and amounted in 1887 to 1400 tons.

The Nanusa Islands (Dutch East Indies).—A partial exploration of this small and little-known group of islands was carried out about two years ago by Lieut. Count v. Hogendorp, on board the Dutch steamer *Bali*, the results of which are given in a paper by Herr F. Wübben, published, with a sketch map, in Petermann's 'Mittheilungen' (Part 5). The islands, which are seven in number, are situated in $4^{\circ} 35'$ N. lat. and $127^{\circ} 5'$ E. long.; the nearest group to them is the Tulus Islands. Three of the islands only, viz. Karaton, Mengampit, and Onrata, are inhabited, the total population being about 1000. The two former have an extent of about three square miles. All the islands are surrounded by reefs, and the only good anchorage is on the east side of Karaton. The latter island is very flat, but Mengampit, lying to the east, contains a hill in

the centre, with an elevation of 800 feet. The whole of Mengampit is thickly wooded with the exception of the hill summit, where the trees have been cut down and gardens have taken their place. Fresh water is obtained from wells in the interior, but it is very bad and has an unpleasant odour. The inhabitants are occupied principally in fishing and in the cultivation of maize and potatoes. Their language is related to that of the inhabitants of the Southern Philippines, but a few of the people understand and speak the Malay tongue.—The author of the paper states that the islands shown on some maps as the “Menangis Islands” do not exist, and have apparently been confounded with some of the Nanusa group.

Exploration of Russian Lapland.—In the course of this summer the Geographical Society of Russia propose to send an expedition to Russian Lapland, the carrying out of which has been entrusted to M. Bashlund, the astronomer, who will be assisted by M. Kudriartsov, as naturalist, and MM. Bogdanov and Pleshe; all of them possessed of considerable knowledge of the country. The greater proportion of the cost of the expedition will be borne by M. Latkin, a St. Petersburg merchant.—The Swedish part of Lapland was explored during the summer of 1886 by M. Fr. Svenonius, the geologist, who made numerous observations on the formation of the mountains, valleys and glaciers, and the limits of vegetation, besides determining a considerable number of altitudes. His anthropological and ethnographical investigations on the Lapps and Finns are of great interest. The report of the expedition, which was undertaken under the auspices of the Swedish Anthropological and Geographical Society, appears in ‘Ymer’ (Nos. 2–4, 1887).

Hypsometry of the Dolomites.—The last survey of the Austrian Alps, undertaken, partially at the instigation of the Viennese Alpine Societies, by the Austrian Staff, has already led to some important, if not altogether unexpected, results. Thus the Marmolata, the highest dolomite, is reduced from 8494 m. (11,464 feet) to 3359 m. (11,016 feet). The Antelao comes next, reaching (according to the new Italian Survey) 3320 m. (10,874 feet). Mr. D. Freshfield pointed out in 1875 in his ‘Italian Alps’ that the two highest points of the Primiero group do not differ by 159 m., as then indicated in the Government survey, but are almost equal in height. The new measurements show a difference of only 16 feet between them, and reverse the advantage. The figures are subjoined:—

	● Last Survey.	Old Survey.	Previous Kadaster measurement.
	m.	m.	m.
Cima di Vezzana	3191	3061	3317
Cimon della Pala	3186	3220	3343

The Cima di Vezzana is therefore 10,470 feet, and the Cimon della Pala 10,454 feet. The remaining peaks of the Primiero group gain or lose only a few feet by the new measurements.

Arid Lands in the United States.—Congress has been asked for an appropriation of 250,000 dollars to pay for the preliminary work of damming up the cañons of the Rocky Mountains, from the Dominion Line to Mexico, and thus forming vast reservoirs of water to be used in the irrigation of arid lands, and preventing the disastrous floods in the lower Mississippi. The area of arid land in the United States, according to *Science*, is 1,300,000 square miles; and Major Powell, Director of the National Survey, estimates that at least 150,000 square miles of this might be reclaimed. The plan is to build dams across all the cañons in the mountains, large enough and strong enough to hold back the floods from heavy rains and melting snows, and then to let the water down, as it may be needed, upon the lands that would be reclaimed. The preliminary work, for which the appropriation is asked, is to pay for surveys to determine the sites and locations for the dams, reservoirs, canals, and irrigation areas; the total volume of water susceptible of storage, and the loss through evaporation in the reservoirs and canals; the area of land to be served by a unit of water; the value of the redeemed land for the growth of crops adapted to the climate and soil; and the expense of constructing and maintaining the dams and canals. It is estimated that two years would be occupied in the preliminary work, and Major Powell, who has probably studied the Rocky Mountains and the arid region more carefully than any one else, declares the scheme to be perfectly feasible.

The Peruvian Port of Mollendo.—According to Sir C. Mansfield, our Consul at this port, the prospects of trade are encouraging. The opening up of the river Desaguadero, which connects Lake Titicaca with Lake Poopo in the interior of Bolivia, to navigation for small steamers promises to prove of great utility to the interior of both Peru and Bolivia, as the riches of these countries lie in their metal and vegetable products, and all that is wanted is easy communication by rail and water between the interior and the coast. The report states that when the railway from Mollendo is extended further inland, large quantities of cereals will be raised as there are extensive tracts of land, well supplied with water, suitable for the production of wheat, &c., in such abundance that Peru could be a wheat exporting country, instead of drawing its supplies, as now, from Chile and California; the want of proper means of transport to the coast has hitherto discouraged farmers in the interior from cultivating these lands. The exports for 1887 amounted to 387,052l.

CORRESPONDENCE.

The Dutch Boundary Line in North-eastern Borneo.

AMSTERDAM, May 9th, 1888.

THE January number of the 'Proceedings of the Royal Geographical Society' contains an exceedingly interesting paper by D. D. Daly, in which the author describes two exploring expeditions he undertook from the east and west coast of North Borneo to the countries and tribes of the interior.

This paper is accompanied by a detailed map,* which proves that several surveys and explorations of great importance for our geographical knowledge have already been accomplished: in this chart, especially as regards the south-east coast, a diligent use seems to have been made of the different hydrographical labours performed by the Dutch Navy in and about St. Lucia Bay, and a chart of which has been compiled by the Dutch naval officer, J. F. M. Lange, and published in the 'Tijdschrift van het Nederlandsch Aardrijkskundig Genootschap' (Periodical of the Dutch Geographical Society), vol. vii. p. 70 *seq.*

Now, if we compare the two forementioned maps, which otherwise exhibit, as regards St. Lucia Bay, the islands situated therein, and the rivers falling into it, a remarkable coincidence, we are particularly struck on seeing that the *boundary line* of the North Borneo Company's territory is drawn more southerly than is warranted, according to the official Dutch records. As early as 1868, the Dutch astronomer, Professor Oudemans, has fixed on *terra firma* on the north side of St. Lucia Bay an astronomical point at $4^{\circ} 19' 57''$ N. lat. and $117^{\circ} 44' 52''$ E. long. from Greenwich. When a few years later, just in consequence of negotiations entered upon by Mr. Overbeck with the Sultan of Sulu (Solok), the attention of the Dutch Government was directed more especially to that part of the coast of Borneo, it was resolved to mark the northern boundary of the Dutch dominion there by a visible sign, and consequently, in 1879, the Dutch flag was hoisted a little westwards of Cape Batu Tjinagat, on a spot on the left bank of the river Tawao, which empties itself on the north coast into St. Lucia Bay, and the guarding of the flag was committed to the Dutch vessels of war stationed in those waters.

So, on the Dutch side this cape is very positively assumed to be the boundary point of the Dutch dominion on the east coast of Borneo; as, indeed, is unequivocally evident by the maps emanating since that time from the said Government, or published under its sanction.

On the map accompanying the paper in question in the 'Proceedings,' however, the boundary of the dominion of the North Borneo Company is stated differently in the sense that this boundary is assumed to be considerably more southerly. Not only the whole north coast of St. Lucia Bay, but even the anything but important islands situated more southerly, such as Sebatik, Nanokan, and others, as also the coast trending to the south as far as the southern arm of the Sibucu river, are represented as belonging to the already so extensive dominion of the Company, while also the boundary line of the indeed hitherto quite unknown interior in the westerly direction is drawn apparently much further to the south than is warranted.

Though readily assuming that this approximative boundary line thus drawn is the result of a misconception, which, as shall be explained further on, may be very easily accounted for; yet the Council of the Dutch Geographical Society has thought it its duty to offer this animadversion to the Council of the British Royal Geographical Society.

Now, Mr. Overbeck did indeed obtain from the Sultan of Solok (Sulu) the transfer of his rights on the north-east coast of Borneo, from Maludu Bay, including Sandakan Bay, to the river Sibucu; but this happened at a period (1878) when that word Sibucu figured on the existing maps in quite another place than the right one, as resulted from the hydrographic surveys made by the Dutch Navy. Evidently some other river was meant by this transfer, which, on account of the great resemblance of these unusual names, may so easily be the case, especially when the nomenclature of existing doubtful data is consulted instead of having recourse to trustworthy local investigations. To give a single instance, borrowed from this very territory: the real Sibucu river, before falling into St. Lucia Bay, divides into two branches, of which the northern retains the name of Sibucu, but the southern takes the name of Sungei Bucat.

That another river must have been meant here than the now more definitely known Sibucu is chiefly owing to the very vague accounts about this river in former times. Thus, in the map belonging to the work, 'Um die Erde,' by Joseph Lehnert, published at Vienna in 1877, we find a part of the coast in question called "Friedrichshafen, in Sibucu Bay," and the river marked there with a couple of islets before its mouth, "Sibucu river." Now, the east angle of that estuary being situated at $4^{\circ} 20'$ S. lat. and $118^{\circ} 23'$ E. long., another river must unquestionably be meant than the real Sibucu. Whereas, on the English Admiralty Chart of 1881, the channel north of the Isle of Sebatik and south of the south coast of St. Lucia Bay is called Sibucu; and, lastly, in the map accompanying the documents concerning the affair Overbeck, which were laid before the English Parliament in 1882, these same waters are called by another name, viz. "Kalabakan." Thus a sufficient difference of conception, till finally the Dutch Navy instituted a comprehensive and exact investigation, and ascertained the true state of the case.

If now we further bear in mind that on the aforementioned north coast of St. Lucia Bay, a little easterly of Cape Batu Tjinagat (the boundary adopted by Netherland), we find the Belikan or Nagas river, which empties itself into a small bay, in which are two islets; that by the Dutch ships of war the east angle of St. Lucia Bay has been ascertained in 1881 to be situate $4^{\circ} 19'$ N. lat. and $118^{\circ} 23'$ E. long.—then we must needs come to the conclusion (on comparing the determination made by the Austrian corvette *Erzherzog Friedrich*, as published in the aforementioned work of Lehnert), that the said Belikan or Nagas river must be the same as the one called by Lehnert the Sibucu.

If we further consider in connection with what we have said, that the stipulations of the transfer concluded in 1878 between Overbeck and the Sultan were founded on the explorations made by the Austrian Navy in 1874 and 1876, and published in the work of Lehnert, then the Council of the Dutch Geographical Society can come to no other conclusion but this:—That, what is mentioned in that transfer under the name of Sibucu river, is in reality the Belikan or Nagas river, and ought to have been called so; and that consequently the boundary of the dominion of the North Borneo Company is to be drawn at the last-mentioned river, and not at the true Sibucu, a conception perfectly in accordance with the purport of official Dutch documents.

W. F. VERSTEEG, Colonel,
President of the Geographical Society of the Netherlands.

To the Secretary R.G.S.

The Agricultural Capabilities of Newfoundland.

ST. JOHN'S, NEWFOUNDLAND, May 29th, 1888.

SIR,—I read with much pleasure Mr. Holme's valuable paper on the interior of Labrador which appeared in the Record of the Royal Geographical Society for April. In the discussion which followed the reading of the paper, the Rev. G. G. Curling and General Dashwood made some observations on the agricultural capabilities of Newfoundland, to which I am inclined to take strong exception. The former gentleman said that "in the interior of Newfoundland not much could be done in the way of agriculture"; and General Dashwood declared that "the interior of Newfoundland was not an agricultural country. The fine agricultural land which was sometimes described, was rocks and bog, and the timber scrub. The land was very inferior."

These statements, as I believe, are entirely misleading, though, of course, not intentionally so; and being made before the Royal Geographical Society, and reported

in their Proceedings, are calculated to injure the character of the country in the eyes of the world. Of course I do not know on what grounds these gentlemen formed such an opinion of the soil and timber of Newfoundland, but I do know that their views are contradicted by the strongest and most conclusive evidence.

The late Alexander Murray, C.M.G., F.G.S., spent more than twenty years in carrying out the geological survey of Newfoundland, having an able assistant in Mr. James P. Howley, F.G.S. Before coming here, Mr. Murray had spent twenty-four years as a colleague of Sir William Logan on the geological survey of Canada. His qualifications for the work here were of the highest order, and his character as a scientific man ranked high. No man could be better fitted to judge of the character of the soil and the general features of the country. He had no motive for exaggeration or misrepresentation in regard to the island, and his reputation as a scientific man was at stake. He had every reason to exercise care, and to secure accuracy in any statements he might make regarding the natural resources of the country, as the Government and the people would be guided by these, and any errors would be sure to be detected. The same was true of Mr. Howley, his assistant, who is now in charge of the survey.

The reports of these able observers appeared annually, and have been reprinted in a portly volume (E. Stanford, publisher). In my article on "Newfoundland" in the 'Encyclopædia Britannica,' and my book entitled 'Newfoundland: the Oldest British Colony' (Chapman & Hall, 1883), I have embodied the results of their reports on the climate, soil, timber, and general agricultural capabilities of the island, and these completely contradict the statements I have quoted.

In a brief communication like this, it is of course impossible to go into details; but I may say, in general terms, that the evidence collected by these scientific men, whose testimony cannot be impeached, has revealed a country possessed of very great agricultural resources, many fertile valleys, pine forests, and mineral districts, awaiting the strong arm of labour for their development. No doubt there are barren districts, and areas covered with swamps and bogs and scrub timber, just as in Canada and the Maritime provinces; but, as in this case, there are also extensive fertile belts admirably adapted for settlement, and capable, if cultivated, of sustaining a large population in comfort.

The reports of Mr. Murray and Mr. Howley show that in St. George's Bay, Port-a-Port, and in the Codroy valleys, Bay of Islands, and the valley of the Humber, there are 1330 square miles capable of being converted into productive arable and grazing land, the valleys being, for the most part, well wooded, and containing valuable timber. Then in the great valleys of the Exploits and Gander, the Terra Nova and Gambo valleys, the reports show there are 3320 square miles; or in all, in these valleys alone, 4650 square miles, or 2,976,000 acres, well adapted for settlement, and capable of supporting a large population.

These are the more extensive tracts of fertile land; but there are, around the heads of the great bays and along the banks of the smaller rivers, many more fertile areas, each of limited extent, but forming in the aggregate very extensive breadths of good land; while in the province of Avalon, the southern portion of the island, there are large districts admirably adapted for cattle and sheep raising; or in all, not less than five million acres in the island well fitted for agricultural and grazing purposes. As yet, only the poorer soils along the sea-margin are cultivated, and that on a small scale; and yet the annual produce is \$612,350 in value, and the total value of the land under culture is \$2,500,000.

The forest wealth of the country is also great. In the great valley of the Gander alone, Mr. Howley reports that there are about 1000 square miles of pine, spruce, birch, and larch forests, most of the area being worthy of being laid out as timber limits, in which an immense timber trade could be carried on. There are

also in other regions large forests of pine, black spruce, fir, yellow and white birch, &c.

Now I submit that, in the face of such conclusive evidence, the assertion of General Dashwood that "the fine agricultural land which was sometimes described, was rocks and bog, and the timber scrub," is unwarranted. The General only knows it as a deer-shooting country, and in pursuit of his favourite sport he naturally sought the high bare ridges where alone the caribou are to be found, but he never entered the fertile wooded tracts which are described in Mr. Murray's reports.

M. HARVEY.

To the Editor of the 'R. G. S. Monthly Proceedings.'

THE ANNIVERSARY MEETING, MAY 28TH, 1888.

General R. STRACHEY, B.E., F.R.S., President, in the Chair.

ELECTIONS.—*Wm. Arthur Addinsell, Esq.; James Edward Ashton, Esq.; John W. Batten, Esq.; Augustus Cooper, Esq.; Alfred Thos. Corrie, Esq., B.N.; Geo. Langhorne, Esq.; Hy. Wm. Lowe, Esq.; Rev. W. T. McCormick; George Fras. Mewburn, Esq.; Geo. Ernest Morrison, Esq.; Fleming Mant Sandwith, Esq.; Percy Simpson, Esq.; Daniel Spencer, Esq.; Major C. Yate (Bombay Staff Corps).*

The Regulations for the procedure at Anniversary Meetings, and the minutes of last year's Meeting were read by the SECRETARY, Mr. C. R. MARKHAM, C.B., F.R.S.

The CHAIRMAN then appointed Mr. MICHAEL BEAZELEY and Mr. J. S. DYASON as Scrutineers of the ballot about to take place.

Mr. CLEMENTS R. MARKHAM (Secretary) read the Annual Report of the Council, as follows:—

REPORT OF THE COUNCIL.

The Council have the pleasure of submitting to the Fellows the following Report on the financial and general condition of the Society:—

Members.—The number of Fellows elected during the year (ending April 30th, 1888) was 168, besides three Honorary Corresponding Members. In the previous year, 1886–87, the total elections amounted to 206, and in 1885–86 the number was 173. Our losses have been, by death 72 (besides 3 Honorary Corresponding Members), by resignation 51, and by removal on account of arrears of subscription 74; making a decrease for the year of 29. In the year 1886–87 there was an increase of 25; in 1885–86 an increase of 16. The total number of Fellows on the list (exclusive of Honorary Members) on the 1st May was 3391.

Finance.—As will be seen by the annexed Balance Sheet, the total net income for the financial year ending 31st December, 1887 (i.e. exclusive of balance in hand), was 8007*l.* 16*s.* 3*d.*, of which 5861*l.* consisted of entrance fees and subscriptions of Fellows. In the previous year, 1886, the total net income was 7968*l.* 9*s.*, and the amount of subscriptions, &c., 5859*l.*; in 1885 the two totals were 7740*l.* 11*s.* 5*d.*, and 5625*l.* respectively.

The net expenditure for the past year (i.e. exclusive of balance in hand) was 8493*l.* 10*s.* 3*d.* The net expenditure in 1886 was 7767*l.* 18*s.* 0*½d.*; in 1885, 8053*l.* 12*s.* 4*½d.*

The Finance Committee of the Council have held, as usual, Monthly Meetings during the year, supervising the accounts of the Society. The Annual Audit was held on the 22nd of March last, the Auditors being, on behalf of the Council, Sir Rawson W. Rawson and Sir Henry Barkly, and on behalf of the Fellows at large,

E. O. Tudor, Esq., and J. Duncan Thomson, Esq. The cordial thanks of the Council and Fellows are due to these gentlemen for having freely devoted their valuable time to this important task. At the end of their labours the Auditors drew up the following report to the Council:—

Auditors' Report.—"The Auditors appointed for the examination of the Accounts of the Royal Geographical Society for the year ending 31st December, 1887, have examined the Balance Sheet submitted, and have compared it with the Account Books and vouchers of the Society, and have found the same to be correctly stated and sufficiently vouched. They have pleasure in renewing their testimony as to the efficiency and accuracy of the Accountant.

"The investments amount to the same sum as last year, viz. 19,568*l.* 12*s.* 4*d.* It scarcely appears necessary to repeat annually the details of these investments, but the following may be a convenient form in which to state them in the present and future years:—

	£	s.	d.
Davis bequest	1800	0	0
Murchison bequest	1000	0	0
Gill Memorial	1028	5	6
Peck Grant	1000	0	0
Back bequest	561	0	8
Trevelyan bequest	510	4	0
Miscellaneous	13,669	2	2
	<hr/> £19,568 12 4 <hr/>		

"The Balance Sheet exhibits satisfactory results, inasmuch as the receipts of the year have slightly exceeded those of 1886, and have sufficed to provide, as anticipated by the Auditors of last year, for the contribution of 1000*l.* to the Emin Bey Relief Expedition, as well as for sundry other special disbursements incidental to the service of the year. The Balance, however, of 525*l.* with which the year began, has been nearly exhausted.

"A comparison of the last three years shows the following result:—

Years.	Ordinary Receipts.	Total Expenditure.			£
	£	£			
1885	7741	8055	Excess	..	314
1886	7968	7768	Surplus	..	200
1887	8008	8493	Excess	..	485

"This comparison shows that the ordinary expenditure of the last three years has been well within the ordinary receipts, for the expenditure of 1885 included a sum of 515*l.* granted in aid of explorations.

"The arrears of subscriptions, valued last year at 440*l.*, have increased this year to 470*l.*

"The total assets of the Society, valued last year at 40,533*l.* 15*s.* 6½*d.*, are now estimated at 40,078*l.* 7*s.* 0½*d.*, the decrease being accounted for by the reduction in the balance at the close of the year.

(Signed)

RAWSON W. RAWSON,
HENRY BARKLY,
J. D. THOMSON,
E. O. TUDOR, } *Auditors.*

"March 22nd, 1888."

The following Balance Sheet and Statement, showing the Receipts and Expenditure of the Society from the year 1848 up to the present date, are annexed to the Report of the Auditors:—

<i>Receipts.</i>		BALANCE SHEET FOR THE YEAR 1887.		<i>Expenditure.</i>	
	£ s. d.	£ s. d.		£ s. d.	£ s. d.
1887.			1887.		
<i>Balance in Bankers' hands 31st Dec. 1886...</i>	507 19 3		<i>House:—</i>		
<i>Do. Accountant's do.</i>	17 9 6½		Taxes and Insurance..	119 10 8	
		525 8 8½	Repairs and Furniture	357 2 5	
<i>Subscriptions:—</i>			Coals, Gas, and Water	75 15 9	
For the current year ..	3803 0 0		Miscellaneous	111 17 3	664 6 1
Paid in advance	606 0 0		<i>Office:—</i>		
Arrears	346 0 0	4755 0 0	Salaries	984 12 0	
<i>Entrance Fees .. ..</i>	.. ..	537 0 0	Stationery and Printing	251 15 1	
<i>Life Compositions .. ..</i>	.. ..	569 0 0	Miscellaneous	176 11 1½	1412 18 2½
<i>Payments made in error</i>	.. ..	53 0 0	<i>Library:—</i>		
<i>Parliamentary Grant ..</i>	.. ..	500 0 0	Salaries	310 0 0	
<i>Royal Premium .. ..</i>	.. ..	52 10 0	Purchase of Books ..	61 14 7	
<i>Rent of Shop and Vanits</i>	.. ..	140 6 8	Binding	87 8 3	
<i>Publications, sale of ..</i>	306 6 7		Miscellaneous	40 6 9	499 9 7
<i>Advertisements in 'Proceedings'</i>	150 0 0	456 6 7	<i>Map-Room:—</i>		
<i>Loan of Diagrams .. ..</i>	.. ..	6 15 6	Salaries	435 0 0	
<i>Payments for Scientific Instruction .. ..</i>	.. ..	46 7 6	Purchase of Maps and Diagrams	83 10 11	
<i>Sale of Tickets for Soirée at South Kensington ..</i>	.. ..	88 0 0	Instruments and Repairs	24 15 6	
			New Map-cases	97 18 4	
<i>Dividends:—</i>			Miscellaneous	83 14 10½	724 19 7½
North-Eastern Railway			<i>Map-Drawing-room:—</i>		
4 per Cent. Debenture Stock... 1000l.	38 14 2		Salaries	360 0 0	
Great Indian Peninsula Railway 5 per Cent. Stock .. 4000l.	247 18 4		Drawing Materials ..	11 1 8	
Great Western Railway 4½ per Cent. Stock [Davis Bequest] 1800l.	74 0 7		Miscellaneous	5 0 0	376 1 8
London and North-Western Railway 4 per Cent. Debenture Stock [Murchison Bequest] 1000l.	38 14 2		<i>Meetings:—</i>		
Caledonian Railway 4 per Cent. Preference Stock .. 2000l.	77 8 10		Evening Meetings ..	163 19 11	
Norwegian 4 per Cent. Bonds .. 1000l.	38 15 0		Soirée at South Kensington	306 14 6	
New South Wales 3½ per Cent. Stock [Gill Memorial] 1028l. 5s. 6d.	34 17 4		Miscellaneous	32 2 1	502 16 6
India Stock .. 1000l.	43 12 2		<i>Medals and other awards</i>	.. ..	136 10 6
India 3½ per Cent. Debentures .. 1000l.	33 18 1		<i>Scientific Purposes:—</i>		
Consols 3669l. 2s. 2d.	106 12 8		Scientific Instruction..	82 15 0	
" [Peck Fund] 1000l.	29 1 3		Expenses on account of Geographical Exhibition	121 6 5	
" [Back Bequest] 561l. 6s. 8d.	16 6 3		Grant to Oxford University	75 0 0	
" [Trevelyan Bequest] 510l. 4s. 0d.	14 6 6		Grant to Oxford University Extension ..	60 0 0	
Interest on 1000l. deposited from Feb. 23 to October 5	8 14 8		Grant to Mr. Mackinder	50 0 0	
		803 10 0	Miscellaneous	5 10 7	394 12 0
		£ 8533 4 11½	<i>Publications:—</i>		
			Printing 'Proceedings'	1169 7 4	
			Maps and Illustrations	646 13 2	
			Postage of 'Proceedings'	280 10 2	
			Payments to Contributors, Translations, &c.	204 0 0	
			Editor of Publications	200 0 0	
			Printing Vol. 2, Part 1, Supplementary Papers	96 13 9	
			Maps for Supplementary Papers	79 18 6	
			Miscellaneous	8 10 9	2685 13 8
			<i>Payments in error returned</i>	.. ..	38 0 0
			<i>Expedition:—</i>		
			Grant towards Emin Bey Expedition ..	1000 0 0	
			Expenses on account East African Expedition	58 2 5	1058 2 5
			<i>Balance in Bankers' hands 31st Dec. 1887...</i>	27 2 0	
			<i>Do. Accountant's do.</i>	12 12 8½	39 14 8½
					£ 8633 4 11½

REGINALD T. COCKS,
Treasurer.

Audited and found correct, 22nd March, 1888.
RAWSON W. RAWSON,
HENRY BARKLY,
J. P. THOMSON,
E. O. TUDOR,

Auditors.

STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year 1848 to the 31st Dec., 1887.

	Year.	Cash Receipts within the Year.	Cash Amounts invested in Funds.	Deducting Amounts invested in Funds; actual Expenditure.
		£ s. d.	£ s. d.	£ s. d.
¹ Includes Treasury Grant of 1000 <i>l.</i> for the East African Expedition.	1848	696 10 5	.. ..	755 6 1
	1849	778 3 0	.. ..	1,098 7 6
² Includes Treasury Grant of 2500 <i>l.</i> for the East African Expedition.	1850	1,036 10 5	.. ..	877 2 10
	1851	1,056 11 8	.. ..	906 14 7
	1852	1,220 3 4	.. ..	995 13 1
³ Includes Legacy of Mr. Benjamin Oliveira, 1500 <i>l.</i> 17 <i>s.</i> 1 <i>d.</i>	1853	1,917 2 6	.. ..	1,675 6 0
	1854	2,565 7 8	.. ..	2,197 19 3
	1855	2,584 7 0	.. ..	2,636 3 1
⁴ Includes Legacy of Mr. Alfred Davis, 1800 <i>l.</i>	1856	3,372 5 1	533 10 0	2,814 8 1
	1857	3,142 13 4	378 0 0	3,480 19 9
⁵ Includes Legacy of Sir Roderick Murchison, 1000 <i>l.</i>	1858	3,089 15 1	.. ..	2,944 13 6
	1859	3,471 11 8	950 0 0	3,423 3 9
	1860	26,449 12 1	466 17 6	6,406 3 7
⁶ Includes Mr. James Young's Grant for Congo Expedition, 2000 <i>l.</i>	1861	4,792 12 9	1,358 2 6	3,074 7 4
	1862	4,659 7 9	1,389 7 6	3,095 19 4
⁷ Includes 1000 <i>l.</i> 14 <i>s.</i> 6 <i>d.</i> sale of Exchange Bills.	1863	5,255 9 3	1,837 10 0	3,655 4 0
	1864	4,977 8 6	1,796 5 0	3,647 7 10
⁸ Includes Mr. James Young's Grant for the Congo Expedition, 1041 <i>l.</i> 14 <i>s.</i>	1865	4,805 8 3	1,041 5 0	4,307 4 5
	1866	5,085 8 3	1,028 15 0	4,052 15 0
	1867	5,462 7 11	1,029 0 6	3,943 17 4
	1868	5,991 4 0	1,857 3 9	4,156 17 10
⁹ Includes Parliamentary Grant of 3000 <i>l.</i> to Cameron Expedition.	1869	6,859 16 0	2,131 5 0	4,646 0 9
	1870	6,042 6 1	3,802 6 0	3,845 10 6
¹⁰ Includes Donation of 500 <i>l.</i> by Mr. C. J. Lambert.	1871	6,637 3 7	1,000 0 0	3,726 4 4
	1872	6,119 7 9	1,999 4 6	5,871 13 2
	1873	7,761 18 10	2,015 1 8	6,697 12 6
¹¹ Includes Legacy of Admiral Sir George Back, 540 <i>l.</i>	1874	6,753 5 10	499 0 0	7,762 2 3
	1875	7,934 15 10	2,002 7 6	5,683 4 10
	1876	11,611 11 8	.. ..	6,870 13 1
¹² Includes Legacy of Sir W. C. Trevelyan, 500 <i>l.</i>	1877	107,950 1 11	2,538 2 0	8,940 17 11*
	1878	118,124 10 0	3,000 0 0	6,361 9 6
¹³ Includes 1005 <i>l.</i> 8 <i>s.</i> 2 <i>d.</i> , sale of Exchange Bills.	1879	128,979 14 10	1,551 10 10	6,990 14 2
	1880	8,599 18 4	1,567 5 1	8,454 1 10†
¹⁴ Includes 1000 <i>l.</i> received from Mr. B. Leigh Smith.	1881	8,809 19 5	.. ..	8,362 5 6‡
	1882	128,942 15 0	.. ..	8,779 10 7
	1883	149,599 9 0	1,001 5 0	8,624 2 11
¹⁵ Includes 500 <i>l.</i> on loan from Bankers.	1884	128,964 11 7‡	.. ..	9,266 0 5
¹⁶ Includes 998 <i>l.</i> 6 <i>s.</i> 10 <i>d.</i> , sale of India Debentures.	1885	168,738 12 3	.. ..	8,555 3 10‡
	1886	177,968 9 0	1,000 0 0	7,767 18 0‡
¹⁷ Includes Donation of 1000 <i>l.</i> from Miss Gill.	1887	8,007 16 3	.. ..	8,493 10 3

* This sum includes the Special Parliamentary Grant transferred to the Cameron Expedition Fund in February, 1877.

† This amount includes the payment of two sums of 500*l.* each, contributed to the African Exploration Fund in this and the previous year.

‡ This sum includes the payment of 102*l.* 8*s.* to the African Exploration Fund; also 714*l.* 9*s.* 1*d.*, the final payment for Cameron Expedition Fund.

STATEMENT OF ASSETS—31st December, 1887.

	£.	s.	d.
Freehold House, Fittings, and Furniture, estimated (exclusive of Map Collections and Library insured for 10,000 <i>l.</i>)	20,000	0	0
Investments (amounts of Stock), as detailed in the above Report of the Auditors	19,568	12	4
Arrears due on December 31, 1887, £1183 0 0, Estimated at	470	0	0
Balance at Bank	£27	2	0
„ in Accountant's hands	12	12	8½
Total	£40,078	7	0½

Publications.—The monthly 'Proceedings' have been issued with regularity throughout the year; the twelve numbers for 1887 forming a volume of 826

pages, illustrated by 18 maps and 3 pictorial diagrams. The total cost of the edition of 5000 copies (including 280*l.* 10*s.* 2*d.* for free delivery to Fellows and Institutions) was 2096*l.* 10*s.* 8*d.* From this is to be deducted the amount of 456*l.* 6*s.* 7*d.* received from sale of copies to the public and from advertisements. One part of the 'Supplementary Papers' (Vol. II. Part I.) was also issued during the year; the total cost of which was 176*l.* 12*s.* 3*d.*

Scientific Purposes Grant.—During the past year twenty intending travellers have received instruction from Mr. Coles in Practical Astronomy in the Society's Observatory, and in route-surveying with the theodolite and plane table in the country. The total number of hours devoted to teaching during the year was 268. These figures show that the number of intending travellers who have received instruction is double that of last year, and that the amount of instruction given has considerably increased.

Twenty-six lessons in Botany, twenty in Photography, and nineteen in Geology, have also been given to intending travellers during the year.

The total amount expended by the Society in aid of lessons during the year has been 41*l.* 12*s.* 6*d.*

Instruments to the value of 257*l.* 17*s.* 6*d.* have been lent during the past year to the following travellers:—Mr. T. Bevan, New Guinea, 61*l.* 8*s.* 6*d.*; Mr. W. Montagu Kerr, Central Africa, 62*l.* 19*s.* 6*d.*; Mr. Joseph Thomson, Marocco, 74*l.* 11*s.* 6*d.*; Rev. W. Spotswood Green, British Columbia, 29*l.* 5*s.*; Mr. C. M. Woodford, Solomon Islands, &c., 29*l.* 13*s.*

The instruments lent to the following gentlemen have been returned, with the exception of those which have been lost:—Rev. T. J. Comber (Congo Region), 1886; Mr. A. R. Colquhoun (Burmah, &c.), 1883; Mr. A. P. Maudslay (Guatemala), 1886; Mr. J. T. Last (East Africa), 1885; Mr. C. M. Woodford (Solomon Islands), 1886; Rev. Q. W. Thomson (East Africa), 1876; Mr. H. O. Forbes (New Guinea), 1885; Mon. H. M. P. de la Martinière (Marocco), 1877; Lieutenant J. G. Haggard, R.N. (East Africa), 1884; Mr. W. Montagu Kerr (Central Africa), 1887.

The following is a list of travellers who (with the exception of a few that have been returned) still have the instruments lent them in their possession:—Rev. W. P. Johnson (East Africa), 1879; Rev. W. G. Lawes (New Guinea), 1880; Rev. T. Wakefield (East Africa), 1882–83; Mr. E. Douglas Archibald (for cloud observations in England), 1885; Dr. E. J. Baxter (East Africa), 1884–85; Lieut.-Col. Kitchener, R.E. (East Africa), 1885; Mr. H. H. Johnston (Cameroons District, West Africa), 1886; Mr. T. Bevan (New Guinea), 1887; Mr. Joseph Thomson (Marocco), 1888; Rev. W. Spotswood Green (British Columbia), 1888; Mr. C. M. Woodford (Solomon Islands), 1888.

In several cases where travellers have died abroad, the instruments lent to them have not yet been returned.

Map Room.—The accessions to the Map Room Collection during the past year comprise 1614 Maps and Charts on 2155 sheets; 24 Atlases, containing 710 sheets of Maps, and 946 Photographs and Views. Of these, 32 Maps on 439 sheets, 7 Atlases, and 296 Photographs (including 50 Magic Lantern Slides) have been purchased. The accessions exceed those of last year by 60 Maps on 208 sheets, 7 Atlases, and 398 Photographs.

Among the most important donations to the Map Room Collection are 654 sheets of the Ordnance Survey of the British Isles (presented by the First Commissioner of Public Works, through the Director-General of the Ordnance Survey); 146 sheets of British Admiralty Charts (The Lords Commissioners of the Admiralty, through the Hydrographer); 244 sheets of the various Indian Government Surveys (H.M. Secretary of State for India); 37 French Charts (Service Hydrographique de

la Marine, Paris); 25 United States Charts (Commander J. R. Bartlett. U.S.N., Hydrographer to the Bureau of Navigation, Washington, D.C.); 31 Maps published by Herr Justus Perthes, Gotha, mostly in Petermann's 'Geographische Mitteilungen' (the Publisher); 'The Royal Atlas of Modern Geography,' new edition, 'Atlas General de la Republica Argentina,' and other miscellaneous publications (Messrs. W. & A. K. Johnston); 'Handy Volume Atlas of the World' (Messrs. G. Philip & Son); 191 Photographs of Kashmir and the N.W. Frontier of India (Prof. Thiselton Dyer); 20 Photographs of Scenery in Tierra del Fuego (Señor Julio Popper); 113 Photographs of Russian Central Asia (E. Delmar Morgan, Esq.); 122 Photographs of the Caucasus (M. Moritz von Déchy); 25 Photographs of the Jura Mountains and neighbourhood (James Jackson, Esq., Paris); Parts XXX., XXXI., and XXXII. of Topographischer Atlas der Schweiz (Section Topograph. du Bureau d'État-Major Fédéral à Berne); 19 Maps of the United States and Canada (Messrs. Rand, McNally & Co., Chicago); 3 sheets of the Generalstabens Topographiske Kaart over Danmark (The Danish Minister of War); 6 Sheets of the Survey of the Sandwich Islands (W. D. Alexander, Esq., Surveyor-General); 2 Meteorological Atlases of the Bay of Bengal, and Part III. of the Synchronous Weather Charts of the North Atlantic, &c., for every day from 1st August, 1882, to 31st August, 1883 (Meteorological Office); Nuevo Atlas Geografico del Perú (Don Carlos Paz Soldan); Carta dimostrativa della regione compresa fra Massaua, Keren, Aksum e Adigrat, on two scales (Italian Embassy); Rowley's Map of the Colony of New South Wales, 2 editions (Agent-General for New South Wales); Appleton's Atlas of the United States (Messrs. D. Appleton & Co., New York).

Five new diagrams have been constructed on the premises, and important alterations made to three others. Five diagrams have been drawn outside the building.

Collection of Photographs.—The Society's collection of photographs has been so largely increased during the past year by donations and purchases, authorised by the Council, that it has been found necessary to provide an additional set of cases in the Map Room for their reception, thus making them easily available for reference when required by the Fellows of the Society and the public.

The Educational Collection.—The various articles that were retained from the Educational Exhibition—maps, globes, atlases, text-books, pictures, &c.—have been arranged in a room fitted for the purpose, as the nucleus of a collection of objects used in geographical education. The collection is open to the inspection of Fellows and others interested in education, and has already been visited by a considerable number of persons desirous of obtaining information as to the best appliances available for geographical teaching.

Library.—During the past year 822 books and pamphlets have been added to the Library; 637 by donation, and 185 by purchase; 300 pamphlets have been put in covers by the Society's map-mounter, and 415 volumes have been bound.

The sum of 108*l.* 5*s.* 4*d.* has been spent in purchasing books, and the further sum of 97*l.* 14*s.* 3*d.* in binding for the Library.

Among the more important accessions are the following:—Laveleye's 'Balkan Peninsula' (the Publisher); Hoche, 'Les Pays des Croisades'; Capello and Ivens, 'De Angola á Contracosta,' 2 vols. (the Authors); Danish International Polar Observations, 1882–83, Tome II., 1^{re} Liv. (The Meteorological Institute of Denmark); the publications of the Palestine Pilgrims' Text Society; continuation of the Reports of the Scientific Results of the Voyage of the *Challenger* (by the Lords of the Treasury); the publications of the Meteorological Office, and of the Intelligence Department of the War Office; continuation of the General Report of the Survey of India, and of the Great Trigonometrical Survey of India, Max Müller's 'Sacred Books of the East,' Hunter's 'Imperial Gazetteer of India,' 2nd edition, 14 vols.,

Atkinson's 'Himalayan Districts of the N.W. Provinces of India,' Vol. III., and Logan's 'Malabar,' 2 vols. (H.M. Secretary of State for India); continuation of the Memoirs and Records of the Geological Survey of India (the Indian Government); the Publications de l'École des Langues Orientales Vivantes (The French Minister of Public Instruction); continuation of the Reports of the Tenth Census of the United States, 1880; the publications of the U.S. Geological Survey; The Norwegian North-Atlantic Expedition (the Editorial Committee); Sir R. Temple's 'Journals kept in Hyderabad, Kashmir, Sikkim, and Nepal,' 2 vols. (the Publishers); Charnay's 'Ancient Cities of the New World'; (the Publishers); Martin's 'Westindische Skizzen'; Bergner's 'Rumänien'; Dennis, 'Cities and Cemeteries of Etruria,' 3rd edition, 2 vols.; Riley's 'Athos' (the Publishers); 'Beiträge zur Kenntniss des Russischen Reiches,' Dritte Folge, Band II.; Van den Berg, 'Le Hadhramout'; Erckert's 'Kaukasus'; 'Die Internationale Polarforschung, 1882-83,' 2 vols. (the German Polar Commission); 'Beobachtungen der Russischen Polarstation an der Lenamündung,' II. Theil, I. Lief., 'Beobachtungen der Russischen Polarstation auf Nowaja Semlja,' II. Theil (the Russian Geographical Society); the 'Encyclopædia Britannica,' 9th edition, Vols. XXII. and XXIII. (the Publishers); Theal's 'History of the Boers in South Africa' (the Publishers); Justin Winsor's 'History of America,' Vols. V. and VI.; the Hakluyt Society Publications; Jackson's 'Dalmatia,' &c., 3 vols. (the Publishers); 'Délimitation Afghane' (M. Venukoff); 'Manual of Scientific Enquiry,' 5th edition (the Hydrographer of the Admiralty); Reade's 'Origin of Mountain Ranges'; 'Unser Wissen von der Erde,' 2 vols. (the Publisher); Becker, 'La Vie en Afrique,' 2nd edition, 2 vols. (the Publishers); Soleillet's 'Voyage à Ségon,' (the Publisher); Coudreau's 'La France. Équinoxiale,' 2 vols., and Atlas (the Publisher); Cust's 'Linguistic and Oriental Essays,' Second Series (the Author); Yeats' 'Technical, Industrial, and Trade Education,' 4 vols. (the Publishers); 'Europäische Wanderbilder' (Messrs. Orell Füssli & Co.); Guppy's 'Solomon Islands,' 2 vols. (the Publishers); Howorth's 'Mammoth and the Flood' (the Publishers); Cunningham and Abney's 'Pioneers of the Alps'; Layard's 'Early Adventures,' 2 vols. (the Publishers); Stone's 'Teneriffe,' 2 vols. (the Publishers); 'Meddelelser om Grønland,' 6 vols. (the Commission for the Exploration of Greenland); 'Viaggio della Regia Corvetta "Caracciolo,"' 4 vols.; Darwin's Life and Letters, 3 vols.; Radde's 'Ornitologicheskaya fauna Kavkasza' (the Author); Graham and Ashbee, 'Travels in Tunisia' (the Authors); Güssfeldt's 'Reise in den Andes' (the Author); 'Die Internationale Polarforschung,' 1882-83, 'Beobachtungs-Ergebnisse der Norwegischen Polarstation Bossekop in Alten' (Herr Aksel S. Steen); 'Beiträge zur Geophysik,' I. Band (the Publisher); Samuelson's 'Bulgaria'; James, 'The Long White Mountain' (the Publishers); Little, 'Through the Yangtse Gorges'; Emin Pasha in Central Africa' (the Publishers); Curr, 'The Australian Race,' 4 vols. (the Author); Joest's 'Tätowiren,' (the Author); Letters of Ortelius; Chantre's 'Recherches Anthropologiques dans le Caucase,' 5 vols.; Doughty's 'Travels in Arabia Deserta,' 2 vols.; and Reclus' 'Universal Geography,' 12 vols.

General Sir H. THUILLIER moved the adoption of the Report, which, he said, contained a good deal of information valuable to the Members of the Society, and evidenced the ability and indefatigable exertions of the Council. For the reports and other useful information emanating from the Society the Fellows were, to a great extent, indebted to Mr. Clements Markham, and they must all approve of the Gold Medal being presented to him.

Colonel H. H. GODWIN-AUSTEN seconded the motion. One of the most satisfactory portions of the Report was that which referred to the Scientific Purposes Grant. It was pleasing to find so many intending travellers making use of the

opportunities afforded by the Society, to receive instruction before they started on their wanderings in distant parts.

The resolution was agreed to.

The Ballot for the Council for 1888-89 was then opened.

PRESENTATION OF THE ROYAL MEDALS.

The Royal Medals for the encouragement of Geographical Science and Discovery had been awarded by the Council this year as follows:—

The **FOUNDER'S MEDAL** to **MR. CLEMENTS R. MARKHAM**, C.B., F.R.S., on his retirement from the Honorary Secretaryship of the Society after twenty-five years' service, and in acknowledgment of the valuable services rendered by him to the Society during that period. Also for his numerous and important contributions to geographical literature during the last thirty-five years, including thirty-two papers published in the 'Journal' and 'Proceedings' of the Society; and in recognition of his merits as an active explorer in the Eastern Andes in 1853 and again in 1860, when engaged in relation to the propagation of cinchona, and in Abyssinia in 1866-67, when acting as geographer to the expedition in that country.

The **PATRON'S MEDAL** to **Lieut. H. WISSMANN** in recognition of his great achievements as an explorer in Central Africa, which he has twice crossed from the Atlantic to the Indian Ocean, and especially for the arduous and adventurous journey in which he traced the course of the river Kassai, from its upper waters to its previously unknown confluence with the Congo. His first journey was recorded in the 'Proceedings' of the Society in 1883, and commented upon by our President, Lord Aberdare, in his Address of that year. An account of his last march across the continent, during which he crossed the previously unknown country between the Sankuru and Nyangwe, is published in the 'Proceedings' for December 1887.

In presenting the Founder's Medal, the **PRESIDENT** addressed Mr. Markham in the following words:—Mr. Markham, I feel that I should congratulate myself on being the person entrusted with the duty of presenting to you the Founder's Medal, the symbol of the Royal Geographical Society's recognition of the highest form of merit among those who have devoted themselves to the cause of geographical discovery and the advancement of geographical knowledge.

Our Society will always be proud of having inscribed on the list of its Medallists the names of those who have distinguished themselves in the manner that you have, in the promotion of geographical discovery and the diffusion of geographical knowledge, as well as of those who have been actually engaged in the arduous task of exploring hitherto unknown countries, fully recognising the connection between these two classes of workers which renders them mutually necessary for the complete success of either.

To attempt to recite at length the number and various subjects of the papers that you have communicated to our Society would be impracticable, and much the same may be said of your geographical labours in other directions, whether in the form of publications devoted to geography, or of exertions to promote geographical exploration in all parts of the earth, the Arctic regions and the Tropics, the Eastern and Western Hemispheres having been alike favoured by your well-directed and successful enthusiasm.

I think that I shall include all that need be said further of your claims to receive this Medal when I express my confident belief that, so long as a record shall remain of the history of the Royal Geographical Society, among the names of those who have added to its reputation and increased its usefulness, will be found in a place second only to Roderick Murchison, that of Clements Markham.

MR. MARKHAM on accepting the Medal, said, that the deep and active interest he

had always taken in the science of geography, and in the progress of discovery, had certainly been a source of inexhaustible pleasure to himself. It seemed to him that there was no other department of knowledge which covered so much ground as geography, which was so many-sided, and so calculated to satisfy the longings and aspirations of the mind. The study of a region, from a geographical point of view, embraced the history of its discoverers and their labours, the story of the inhabitants and their progress, the natural history, physical aspects, and indeed everything that could attract the attention and interest of an inquirer. The objects of the Royal Geographical Society embraced the study of every region of the globe from this exhaustive point of view. It was the endeavour of the Society to promote a sound knowledge of every part of the earth's surface, and it was a just ground for pride that it had extended geographical knowledge in every direction. It would have been a sufficient reward to himself personally, as well as a source of gratification and pleasure, that he had had the honour of having been connected officially for so many years with labours of this important character, and that he had been able, in however slight a degree, to help in the great work. The grant to him of the Society's highest honour could not increase his love for geography, nor his affection for the Society—that was impossible; but he should always look upon it as a kind condonation of shortcomings, and as a most generous recognition of services always done zealously and with good intentions if not always judiciously and well. He begged to offer to the President, the Council, and the Fellows, his most sincere and heartfelt thanks for the great honour they had conferred upon him.

In the absence of Lieutenant Wissmann, his Medal was received by Colonel Sir Francis de Winton, R.A., K.C.M.G. The PRESIDENT said: I have much pleasure in handing to you, to be delivered to Lieut. Wissmann, an officer of the German army, this Gold Medal of the Society, at the same time expressing my regret at his absence and the cause of it, and hoping that he may soon be restored to health and the prosecution of his career. It is also incumbent on me, while recognising the great personal merits of Lieut. Wissmann, and of the valuable assistance he received from his various associates in the expedition in which he has been engaged, to express, on behalf of this Society, its high appreciation of what is due to H.M. the King of the Belgians, through whose munificence the later expeditions were organised and equipped.

Lieut. Wissmann's explorations, which have extended over the last seven years, have gone far to open out the southern portion of the great tract included in the Congo Free State, extending over 12 or 14 degrees of longitude, and they will no doubt, before long, lead to the utilisation for purposes of commerce of the great navigable rivers which unite to form the Kassai, the great southern tributary of the Congo, the existence of which they have established, and to the civilisation of the countries through which those rivers flow.

Sir FRANCIS DE WINTON, in acknowledging the award on Lieut. Wissmann's behalf, said, that he was sure the Fellows would agree with him in an expression of sympathy towards Lieut. Wissman. and of regret that he was not able to be present on account of ill-health. He (Sir Francis) had the pleasure of knowing him intimately for two years when they were together on the Congo, and during that period he formed the highest opinion of his abilities, not only as an explorer, but also as an officer of the German army, and as one who had his whole heart and soul in the work in which he was engaged. On his behalf, he thanked the Society for having granted him the Medal. Lieut. Wissmann had written to him to say, "You will be glad to hear that my health is so much better that I can hope now to profit once more by my experience in the service of science and civilisation." Two

months ago he was at Madeira, and intended to return to the scene of his former labours, and no doubt in the future, as in the past, he would add greatly to our geographical knowledge.

THE AWARD OF THE MURCHISON AND CUTHBERT PEEK GRANTS AND THE GILL MEMORIAL.

The PRESIDENT announced that the Council had awarded the above grants as follows:—

The MURCHISON GRANT for 1888, to Mr. J. M'CARTHY (Superintendent of Surveys in Siam) for his excellent map of Siam, and the paper giving a *résumé* of his explorations in that country.

The CUTHBERT PEEK GRANT for 1886-7-8, to Major FESTING, for his services as a cartographer on the Gambia river and the country in the neighbourhood of Sierra Leone.

The GILL MEMORIAL for 1888, to Mr. CHARLES M. DOUGHTY, as a contribution towards the expenses incurred on the map of Arabia, illustrating the recently published account of his travels.

(The BACK GRANT was not awarded this year.)

The Three Honorary Corresponding Memberships for 1888 had been voted to Dr. RADDE, of Tiflis, Dr. H. RINK, of Copenhagen, and Dr. REIN, Professor of Geography at Bonn.

PRESENTATION OF THE TRAINING COLLEGE PRIZES.*

The Scholarships and Prizes offered by the Society to the students of Training Colleges for Geographical proficiency in the Examinations last December had been awarded by the Examiners of the Education Department to the following:—

MALE CANDIDATES. *Scholarship*: J. W. GOODYERE, Borough Road College. *Prizes*: FREDK. BAKER, Cheltenham College; H. GROVER, Battersea College, and J. E. QUAIFFE, Borough Road College; A. J. BERRY, Battersea College.—**FEMALE CANDIDATES.** *Scholarship*: A. E. ALEXANDER, Whitelands College. *Prizes*: A. EVE, Bishop Stortford College. K. CHARLTON, Lincoln College; ISABELLA INNES, Warrington College; GERTRUDE MARTIN, Chichester College.

Before introducing the successful candidates, Mr. FRANCIS GALTON said:—Geographical prizes are given for the first time this year to pupils in training colleges. Our Society has been unremitting in its efforts to stimulate and improve geographical education during the past twenty years, though the direction of its efforts has varied according to circumstances. We began with the public schools, we have given prizes in connection with the Oxford and Cambridge Local Examinations, with the University Extension Scheme, and with Training Ships for the Mercantile Navy. We

* The MEDALS for the Promotion of Geographical Education, placed by the Society at the disposal of the Syndicates respectively of the Oxford and Cambridge Local Examinations, were awarded as follows:—

1887. Oxford (June).—*Silver Medal*—George Henry Ball, Liverpool. *Bronze Medal*—David Landale Johnston, Boston.

Cambridge (December).—*Silver Medal*—(Physical Geography)—Florence Clementina Boyd, Croydon. *Silver Medal*—Elizabeth Charlotte Cowen, Hoxton.

The Prize Atlases offered by the Society for Geographical Proficiency to the cadets of the Nautical Training Colleges on board H.M. ships *Worcester* and *Conway*, were awarded, at the examinations held in July 1887, to the following:—John Chase (*Conway* training-ship); Charles Hay Murray (*Worcester* training-ship).

appointed an Inspector of Geographical Education at home and abroad, we published his report and had it well discussed, and we widely exhibited the valuable collection of educational appliances made by him. We initiated and have taken a half-share in the endowments of a Readership in Geography at Oxford and of a Lecturership at Cambridge. We have made provisions for future scholarships in geography at those Universities. This year we take a new departure in promoting the improved teaching of geography in elementary schools, by giving prizes to those students in Training Colleges who were placed first by their own examiners. I have the greatest pleasure in testifying to the cordiality with which the Education Department responded to our request to be permitted to do so. They understood that we had no intention of meddling with their programme, but that we simply desired to acquaint ourselves with the best fruits of their system of geographical teaching, and to extend our good-will and support to those students who had shown special geographical aptitudes. The Board of Education were so confident of the goodness of the teaching in their Training Colleges, that they were willing and pleased that the Geographical Society should have the opportunity of appreciating it. I have great pleasure in stating that those of our Council who were deputed to acquaint themselves with the character of the geographical examinations in the Training Colleges, and with the answers of the pupils, were most favourably impressed with, and I may add surprised at, the high standard of the one and the excellence of the other. The Council have therefore reason to remain satisfied with their own proposal of accepting the judgment of the examiners of the Education Department as to who deserved the prizes. It has been a very close race, and the winners of the chief prizes have only won by a neck. Our Society regards all the students who have distinguished themselves as future geographical missionaries. They will soon have pupils of their own, and I trust that one effect of their geographical teaching will be to inspire those pupils with an intelligent sympathy with their fellow-subjects abroad. For even if that sympathy never rises above the stage of sentiment, without developing into any definite form of Imperial Federation, it cannot fail to have a large influence in maintaining the cohesion of the British Empire.

The Prizes were then handed by the President to the successful students.

Mr. J. R. LANGLEY (of the Westminster Training College) recognised the great encouragement which would be afforded by such a generous offer of prizes, and said that in connection with the recent Geographical Exhibition, he had suggested this new departure to the Society after the confessed failure of the anticipated result of the distribution of medals to pupils in the great public schools of this country. Every one must perceive the very great value of the knowledge of geography to the masses of this over-populated country who did not understand the advantages which might be derived from emigration. When the condition of affairs in the Colonies was really known, there would be a greater inclination on the part of the people to emigrate to places which greatly needed their services. He had good reason to believe that the Education Department was extremely willing to render still further help to the Geographical Society in encouraging such studies through the elementary schools of the country.

Rev. J. P. FAUNTHORPE (Principal of the Whitelands Training College) expressed his pleasure that the Society had taken this new departure, which was likely to be of immense service to the very highest interests of the Society. The students in the Training Colleges numbered two or three thousand every year, and they would disseminate a knowledge of geography throughout the country in the primary schools, where it was most important that there should be a knowledge of our Colonial empire disseminated, so that we may become in reality as well as in name a united British empire.

No. VII.—JULY 1888.]

2 K

Mr. BOURNE, on behalf of the students of Borough Road College, thanked the Society for the prizes which they had given.

The PRESIDENT said, although the Society gave these prizes for proficiency in Geography, they were not to be understood as rewards for what had been learned, but as inducements to the study of geography. He trusted that those who had not been successful would still remember that they in reality might add very greatly to the utility of the profession which they had adopted, by extending to the utmost of their power the knowledge of geography among their pupils.

THE PRESIDENT'S ADDRESS.

The PRESIDENT read the Annual Address on the Progress of Geography.

On the conclusion of the Address, Sir HARRY VERNER, Bart., proposed a vote of thanks to the President for his Address. Certainly the past year had been one of very remarkable improvement in geographical knowledge. Scientific geography was the foundation of all other sciences with regard to different countries. If our Government had been possessed of geographical knowledge at the time of Lord Ashburton's mission to the United States, the boundary-line between the territories of Great Britain and the States would not have been drawn at the 49th parallel. When he (Sir H. Verney) was in the Pacific, sixty years since, the Columbia river was the boundary. The province between that and the Straits of Fuca was Georgia, perhaps the most valuable district on the west coast of North America. We ceded it, and it is now Washington territory. Our geographical ignorance was the reason why the State of Maine now extends to within a few miles of the St. Lawrence, and why Portland is not ours, our rightful port to Canada. He remembered hearing a Cabinet minister declare in the House of Commons that there was only one road into the Crimea from the interior of Russia, practicable for artillery. He drank tea that evening with Meyer, Prince Albert's secretary, and told him: "What nonsense," said Meyer, "what ignorance! I could tell him of two others quite practicable for artillery." England has sustained losses over and over again, owing to our want of geographical knowledge—that we used to study only Latin and Greek at our public schools. Our country may feel grateful to the Society for the efforts made to dispel that ignorance, and we all thank our President for his interesting and valuable address, declaring to us the progress of geographical knowledge made during the past year.

Sir FREDERICK YOUNG seconded the motion, which was agreed to.

The SECRETARY then read over the names of the Council for 1888-9 as duly elected, according to the report of the Scrutineers of the Ballot.

The Council for 1888-9 is constituted as follows (the names printed in *italics* being new Members or those who change office):—

President: General Richard Strachey, B.E., C.S.I., F.R.S. *Vice-Presidents*: Sir Rutherford Alcock, K.C.B.; *Francis Galton, Esq.*, F.R.S.; Sir Joseph Hooker, K.C.S.I., C.B., F.R.S.; Major-General Sir H. C. Rawlinson, K.C.B.; General Sir C. P. Beauchamp Walker, K.C.B.; Colonel H. Yule, C.B. *Treasurer*: Reginald T. Cocks, Esq. *Trustees*: *Right Hon. Lord Aberdare*, G.C.B., F.R.S.; Sir John Lubbock, Bart., F.R.S. *Secretaries*: Douglas W. Freshfield, Esq.; *Col. Sir Francis W. de Winton, B.A.*, K.C.M.G. *Foreign Secretary*: Lord Arthur Russell. *Members of Council*: Sir Henry Barkly, G.O.M.G., K.C.B.; *J. Ball, Esq.*, F.R.S.; *Lord Brassey*, K.C.B.; Admiral Lindsey Brine; Hon. G. C. Brodrick; J. Annan Bryce, Esq.; Col. J. A. Grant, C.B., F.R.S.; Major-General Sir F. J. Goldsmid, K.C.S.I., C.B.; Sir John Kirk, G.C.M.G., F.R.S.; Lieut.-General Sir Peter S. Lumsden, G.C.B.; Colin Mackenzie, Esq.; *Clements R. Markham, Esq.*, C.B., F.R.S.; *Alfred P. Maudslay, Esq.*; *Admiral Sir*

F. L. M'Clintock, F.R.S.; *E. Delmar Morgan*, Esq.; *Sir Rawson W. Rawson*, K.C.M.G., C.B.; *B. Leigh Smith*, Esq., M.A.; *H. Seebohm*, Esq., F.L.S.; *Capt. W. J. L. Wharton*, R.N.; *General J. T. Walker*, C.B., F.R.S.; *Colonel Sir Charles W. Wilson*, R.E., K.C.M.G.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris, April 20th, 1888.—This meeting was held in the large Sorbonne Hall, in order to celebrate the centenary of the death of Lapérouse. **M. FERDINAND DE LESSEPS**, President of the Society, occupied the Chair, and was supported on the platform by Admiral Krantz, Minister for the Navy and the Colonies, **M. Lockroy**, Minister of Public Instruction, **Prince G. de Leuchtemberg**, **Prince Roland Bonaparte**, **M. Barbey**, late Minister of the Navy, **Rear-Admiral Viscount Fleuriot de Langle**, **Dr. Hamy**, President of the Central Commission, **M. Neurand**, President of the Commercial Geographical Society of Paris, and others, including representatives of most of the chief Geographical Societies of France.—After a brief speech by the Chairman, the following papers were read:—"Notes on the Private Life of Lapérouse," by **M. de Barthès de Lapérouse**, retired naval captain, and grand-nephew of the illustrious traveller; "A Succinct Résumé of the Voyages of Lapérouse," by **M. de Courcel**, late lieutenant of the Navy; and a paper entitled, "How the Remains of Lapérouse were found," by **Vice-Admiral Paris**, Member of the Institute. These three memoirs will be published in the 'Quarterly Bulletin.'—In conclusion, some further observations were made by **M. de Lesseps**.—**Count de Bizemont** afterwards announced that the exhibition of objects relating to the Lapérouse expedition would be opened on the 23rd April at the offices of the Society.

—**May 4th, 1888**: **M. FERDINAND DE LESSEPS**, President of the Society, in the Chair.—This was the first General Meeting of the year. The Chairman, after a few opening remarks, called upon **M. W. Huber**, on behalf of the Commission on the Prizes, to read the general report on the awards made by the Society for the present year, which were as follows:—Gold Medal to **R. P. Roblet**, of the Society of Jesus, for his geographical and topographical map of Madagascar; Gold Medal to **MM. Bonvalot**, **Capus**, and **Pépin**, for their journey to Kafiristan and the Pamir; Gold Medal to **M. Chaffanjon** for his voyage along the Upper Orinoco as far as the vicinity of the sources of that river; Silver Medal to **M. François Coillard**, missionary of the Protestant Evangelical Society, in consideration of his journey in the region north of the Zambesi; the Logerot prize to **Dr. Verneau**, for his valuable monograph on the Canary Islands; and the Jomard prize to **M. Jules Codine**, for his works on historical geography. **M. Huber** then read a résumé of each of the separate reports on the prizes, and the Chairman presented the medals to the various recipients. —**M. J. Renaud**, one of the scrutineers, announced the result of the election for the re-constitution of the Bureau of the Society for 1888-9, as follows:—President, **M. Ferdinand de Lesseps**, of the Institute; Vice-Presidents, **M. A. Grandidier**, of the Institute, and **M. Albert de Lapparent**, Professor of Geology; Scrutineers, **M. Édouard Caspari**, Hydrographical Engineer, and **M. Charles Vélain**, Professor of Physical Geography; Secretary, **M. Édouard Bonvalot**; Treasurer, **M. Meignen**; Librarian, **M. James Jackson**.—In conclusion, **M. Marcel Monnier** gave an account of his journey across South America, of which the following is a brief résumé. The traveller's original plan was to start from the neighbourhood of Quito, and then to strike across to the eastern slope of the Cordillera and the Amazonian basin; he intended then to follow the course of the Rio Pastaza, which had not been so

thoroughly explored as the other great rivers of the same system. Finding himself unable to organise a party at Quito, he determined to start from a point on the Peruvian coast. This he did after some delay, and proceeded to the upper valley of the Rio Marañon. Owing to disturbances among the native Indians, he was unable to cross to the opposite bank of the river. Being compelled to diverge, he marched some 60 leagues to the south to the province of Pataz, and from the village of Tayabamba set out on foot, accompanied only by five Indians, across the Eastern Cordillera, with the object of reaching the upper course of the Rio Huallaga. The journey was full of hardships. For the greater part of the distance the party had to hew out a passage through the dense jungle, having no guide but the compass. Twenty-one days were occupied in covering the distance of 35 leagues, marching on an average nine hours a day. Having arrived on the banks of the Huallaga, the traveller descended the river for 345 miles to its junction with the Marañon. The voyage was accomplished on a small raft or *balsa*, steered by four Indians; the forty-two rapids of the river were successfully passed, nineteen of which, situated between $8^{\circ} 14'$ and $7^{\circ} 50'$ S. lat., were difficult. M. Monnier then ascended in a small steamer the Marañon and Pastaza, penetrating along the latter river for a distance of 50 leagues and exploring on his way Lake Rimachuna. The furthest point reached was a little beyond the Rios Shungashi and Huagaza; here, owing to the increasing difficulties of navigation and the hostile attitude of the Achuelos Indians, he found himself compelled to turn back. His return was effected down the Marañon and Amazon to Para.

— May 18th, 1888: Dr. HAMY in the Chair.—From Hanoi the Society received information that M. Pavie, Vice-Consul of France at Luang-Prabang, had succeeded for the second time in travelling from Laos to Tonking along the Black river. Since his first journey he had ascended the Namu, a tributary of the Mekong, and had from there reached the territory of the Shans. On the present occasion he had travelled from west to east by way of Muong-Son and Muong-Het. These two voyages were stated to be of definite geographical importance.—A communication, dated 17th May, was read from M. G. Rolland, giving an account of the excursion just made by the French Association to Ued-Rir and Tuggurt. This trip was carried out after the Congress had met at Oran. The point of departure was Biskra, whence the distance to Tuggurt is 130 miles. The excursion occupied in all ten days, and the members, after studying the region of Ued-Rir scientifically and economically, returned to Biskra. One of the results of this excursion was to convince the party that this district has a promising future, thanks to the artesian borings and the system of agriculture and colonisation carried out by the French.—Lieut.-Colonel Gallieni, writing from Siguiri on 1st March, stated that having reached the latter town, which is situated at the confluence of the Niger and the Tankisso, he intended to proceed either to Sierra Leone or to the French possessions in Senegal.—A letter was read from Lieut. G. Delalande, second in command of the *Ardent*, informing the Society of some of the results of his cruise along the coast of the Gulf of Guinea. The only Europeans stationed at Little Popo are the German Imperial Commissioner, two lieutenants, and Dr. Wolf. They are stated to be continually absent from the town engaged in exploration, and at the time when the writer visited Little Popo they were in the north of Togo, endeavouring to find a route from Akapame to Agome. The Germans are reported to be ruining the French and English commercial houses; they import tobacco and rum from Europe, and not textile goods. The population of German Togo is about 40,000, and of the Republic of Minas 30,000 only.—The country between the Niari and the Ogowé is to be explored during the summer by M. J. Cholet, who addressed a communication to the Society from Libreville to that effect.—Referring to the voyage of the *Hirondelle* and the scientific investigations upon

the currents of the Atlantic, carried out by Prince Albert of Monaco, M. A. Salles, a member of the Society, wrote from Curaçoa on 28th March, stating that one of the glass bottles thrown into the sea near the Azores by the Prince had been washed up on the island of Oruba at the entrance of the Gulf of Venezuela. The Prince, to whom this letter was forwarded, informed the Society that he intended shortly to communicate to the Society some fresh results obtained from his last campaign in the *Hirondelle*.—The Minister of Public Instruction forwarded an extract from a letter which he had received from M. Coudreau, dated 1st January, 1888, from the sources of the Maroni, 56° W. long. The traveller states that since 1st September last he has been staying in the western part of Upper French Guiana, between the rivers Itany, Maroni, and the central chain of the Tumuc Humac. From a geographical point of view, the results of his explorations are—the discovery of the sources of the Itany and Maroni, the former being about half a degree further west, and the latter about the same distance further to the south-west of the points formerly assigned to them, and the determination of the exact altitude of the western Tumuc Humac. In this region the mountains are from 2000 to 2500 feet above the sea-level. The climate is excellent, and enjoys a perpetual spring. Its average temperature is 75° (Fahr.), the maximum being only 86°. The humidity is much less than on the coast. The Rucuyenne Indians, who inhabit this part, are an important tribe of more than 4000 souls. M. Coudreau visited all their villages. They are eminently peaceable, agricultural, and settled.—The Chairman announced that the Congress of learned Societies, which in former years had been held in the Sorbonne Hall, would take place this year at the office of the Minister of Public Instruction.—In conclusion, M. H. Müller, Director of the East African Company of Rotterdam, read a paper upon his journey in East and South Africa. The traveller's itinerary from Zanzibar was through Mozambique to the Zambesi, thence to Delagoa Bay and through Zulu Land, Natal, Transvaal, and Orange Free State to Cape Colony.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

[**Wales.**—History and Geography of Wales, for the Young. Compiled by an Owner of Welsh land. London, Jarrold & Sons: 12mo., pp. 142. Price 2s. 6d. [Presented by the Publishers.]

In accordance with its title, this little volume is principally intended for young people. It contains some useful notes on the history and geography of Wales, each county being separately treated. A notice is also given of each of the principal towns.

ASIA.

Dallas, W. L.—Memoir on the Winds and Monsoons of the Arabian Sea and North Indian Ocean. Calcutta, 1887: 4to., pp. 45, charts.

Eliot, John.—Report on the Meteorology of India in 1886. Twelfth year. Calcutta, 1887: 4to., pp. iv., 227, and 322, map and charts.

[**India.**—Archæological Survey of India. Report of a Tour in the Panjâb and Rājputāna in 1883–84. By Mr. H. B. W. Garrick, Assistant Archæological Survey of India, under the superintendence of General A. Cunningham, R.E., C.S.I., C.I.E., Director-General of the Archæological Survey of India. Vol. XXIII. Calcutta, 1887: 8vo., pp. iv. and 142, plates. [Presented by the Indian Government.]

[—] General Index to the Reports of the Archæological Survey of India, Volumes I. to XXIII., published under the superintendence of Major-General Sir A. Cunningham, C.S.I., K.C.I.E. By Vincent Arthur Smith. With a Glossary and General Table of Contents. Calcutta, 1888: 8vo., pp. xviii. and 216. [Presented by the Indian Government.]

[—] —Indian Meteorological Memoirs. Published . . . under the direction of Henry F. Blanford, F.R.S. Vol. IV., Part IV.

VI.—List and brief Account of the South-West Monsoon Storms generated in the Bay of Bengal during the years 1882 to 1886.

VII.—The Cyclonic Storms of November and December 1886, in the Bay of Bengal. Calcutta, 1887: 4to., charts.

Temple, Sir Richard.—Palestine Illustrated. London, Allen & Co., 1888: imp. 8vo., pp. xx. and 296. [Presented by the Publishers.]

This is a series of 32 coloured illustrations of places in Palestine, from Sir Richard Temple's own sketches, accompanied by descriptive text. The regions illustrated are Joppa, Ajalon, Jerusalem, Bethlehem, Judah, Jericho, Bethel, Shiloh, Shechem, Samaria, Dothan, Esdraelon, Jezreel, Tabor, Nazareth, Cana, Gennesareth, Tiberias. The record contains a general account of Sir Richard's journey, and fully explains the coloured sketches which he took on the spot; for each illustration there is also a *résumé* of the scriptural events relating to the scene which is depicted. The text has been unnecessarily spread out in the printing. The reproductions of the oil sketches are not always so successful as the original deserved.

Yate, [Major] C. E. [C.S.I., C.M.G.]—Northern Afghanistan, or Letters from the Afghan Commission. Blackwood, Edinburgh and London, 1888: 8vo., pp. vi. and 430. Price 18s. [Presented by the Publishers.]

This volume of letters is intended as a sequel to Major Yate's brother's book, 'England and Russia Face to Face in the East.' Commencing at the time when the question of peace or war between England and Russia hung in the balance, Major Yate describes the sojourn of the British Commission around Herat during the summer of 1885; the subsequent meeting of the joint British and Russian Commissions in November of that year, and the progress of the demarcation of the frontier up to the time of their separation in September 1886; the return of the British Commission through Kabul to India in October 1886; the negotiations at St. Petersburg during the summer of 1887; the final settlement and demarcation of the frontier during the winter of 1887; and return through Russian Trans-Caspian territory in February 1888; with a general description of the various points of interest connected with the frontier, as well as of the people and country traversed, and a few notes on the difference between British and Russian military systems in the East. There are two good maps, and the book abounds with useful notes on the geography of the country and the strange medley of peoples passed through by the Commission.

AFRICA.

Beaulieu, P. Leroy, Membre de l'Institut, etc.—L'Algérie et la Tunisie. Paris, 1887, pp. 472.

This solid volume is a thorough and searching investigation into the history and methods of French rule in North Africa by an experienced economist, whose eyes are in no way obscured by patriotic prejudice, though the object at his heart is the success of his country in her principal colonial enterprise.

There are two features which fill foreseeing French politicians with apprehension in the statistics of Algeria—the proportion between the French and the extraneous European population, and the increase of the native population. "Il y a la Question des Étrangers et la Question des Indigènes." The politician will naturally be of M. Leroy Beaulieu's mind that the first aim of the Colonial Government should be to imitate the United States in naturalising and absorb-

ing the "Étrangers." Its actual policy has been of late years exactly the opposite. It has by legislation of the most arbitrary character placed foreigners at the mercy of their French neighbours and rulers, and done its utmost to drive their much needed capital and energy elsewhere.

With regard to the natives, instability has been the great defect of French rule; they have been alternately flattered and harassed; they have been subjected to a magistracy often inferior to its task and generally devoid of experience; schools have been made very inadequate use of as a means of civilisation and fusion.

The following are a few out of the number of suggestive facts and figures to be gleaned from this volume. There were in 1886, 2,850,000 Mohammedans, 225,000 Frenchmen, and 210,000 other Europeans in Algeria. The mortality of Europeans is 30 per 1000, as compared with 23 per 1000 in France. Births are 35 per 1000. The deficit for the six years from 1881-86 has averaged 10,000,000 francs. Algeria at present (apart from military expenses) costs France annually from 20 to 30 millions of francs. The present hopes of the colony are fixed on its vines; in corn trade it cannot compete favourably with India.

The author draws a lamentable picture of the injury done to the colony by the constant change of officials and the levity with which they have frequently been appointed. He vouches for one instance in which an actor who was hissed off the stage at Algiers was consoled by being named "Civil Commissioner" with the control of from 15,000 to 20,000 Arabs.

He is still more outspoken on the melancholy blunders and inconsistencies inevitable in the attempt to govern a country of which the majority of the population are Orientals by a Parliament of Europeans oversea. M. Leroy Beaulieu qualifies in significant terms the recent Assemblies as composed "de sectaires, d'ignorants et de niais," "d'étourdis et d'imprévoyants." But as we understand him, his argument would extend even to Parliaments composed of less untrustworthy material, and it may be worthy of serious consideration in this country.

The logical conclusion from M. Leroy Beaulieu's impartial statement appears to be that in her attempt to establish a French colony in a region where her emigrants hardly equal in number, and do not equal in energy those from the Mediterranean peninsulas, France is under present conditions engaged in a struggle against the natural tendency of events. Should she ever lose her present position in Europe, her African possessions, it would seem, must fall naturally into the hands of Spain and Italy. Unless, indeed, before that time the French population has resumed a natural rate of increase, and can supply Algeria with something better than the failures of the mother country. It is right, however, to add that such an eventuality is present in M. Leroy Beaulieu's mind only as a possibility to be held up as a warning. He sets out a series of measures whereby he believes French rule may be consolidated and the prosperity of the colony assured. Amongst these is a forward policy in the Sahara. He is in favour not only of the extension of the system of artesian wells already carried out with success in many places, but also of the pushing forward of railways to Ouargla, and as soon as possible to Timbuctoo. He looks forward to the division of Morocco with Spain, and would probably be content, though he does not expressly say so, to leave Tripoli to Italy, in consideration of Tunis, to the political affairs of which the last chapters of his volume are devoted. For these M. Leroy Beaulieu himself must be consulted. Here it must be enough to say that he is entirely averse to Tunis being united to Algeria, that he wishes to see it treated on the model of our Crown Colonies, and that he deprecates "the absurd and antipatriotic customs regulations in force, by which already the export trade to Italy is treble what it is to France."

This book, together with the recent volume of M. Reclus's '*Géographie Universelle*' dealing with North Africa, will furnish to readers the most recent information as to these interesting countries.—[D. W. F.]

Drummond, Henry.—*Tropical Africa*. London, Hodder and Stoughton, 1888: 8vo., pp. x. and 228. Price 6s. [Presented by the Publishers.]

Professor Drummond's most readable volume seems to be mainly expanded lecture-notes, with a reprint of a paper or two that have appeared elsewhere.

Professor Drummond has himself visited the Lake Nyassa region, so that he speaks with personal knowledge. His book is no connected narrative of his journeyings, but rather a series of sketches of African scenery and African life. His graphic and picturesque style will enable the reader to realise certain African conditions much more clearly than is possible from the ordinary book of travel. The character of the vegetation, the real nature of African forests, the conditions of native life, and other points are brought out with great vividness. The contrast between the open nature of the African forest and the dense bush of the forest of South America will be new to many; as will also be the fact that Africa is covered from end to end with a network of narrow but well-worn paths. The first chapter deals with the water-route to the heart of Africa, and especially the rivers Zambesi and Shire. This is followed by a chapter on the East African Lake country—Lakes Shirwa and Nyassa, and another on the aspect of the Heart of Africa, the country and people. Chapter IV. discusses the "Heart-disease" of Africa, its pathology and cure. Mr. Drummond insists on the close relation which exists between the ivory trade and slavery, and maintains that in several ways it would be a good thing for Africa if the elephant were extinct. Chapter V. describes in pleasant and picturesque fashion the author's wanderings in the Nyassa-Tanganyika Plateau. Chapter VI. is mainly a reprint of Mr. Drummond's interesting paper on the White Ant, which he maintains does a similar service to the soil of Africa that the worm does elsewhere. Mimicry of African insects is the subject of Chapter VII., that of Chapter VIII. is the Geology of the Nyassa region, while in Chapter IX. Mr. Drummond discusses some of the problems suggested by the partition of the continent, and strongly advocates the case of the missionaries and traders on Lake Nyassa. Besides the author's route map there are several special maps which add to the geographical value of the volume.

Fasolo, [Professor] Francesco.—*L'Abissinia e Le Colonie Italiane sul Mar Rosso*. Caserta, 1887: 8vo., pp. 273. Price 3 lire. (*Dulau*.)

This book supplies a want. It is a carefully compiled and useful account of the territory claimed by Italy on the coast of the Red Sea, as well as of Abyssinia, which can hardly yet be regarded as an Italian possession. Professor Fasolo has put together from trustworthy sources a very complete account of Abyssinia in its various aspects. Shoa and neighbouring lands are also described; the region of Sahel and Assab; the routes from Massowa and Assab to the interior. The history of Abyssinia is dwelt on at some length, and a chapter is devoted to the Abyssinian army. Appended are maps of Abyssinia and of Massowa and neighbourhood.

Henrici, Ernst.—*Das Deutsche Togogebiet und meine Afrikareise 1887*. Leipzig, 1888: 8vo., pp. 147 and v. Price 2s. 8d. (*Dulau*.)

The author visited the German Togo protectorate on the Gold Coast in 1887, and travelled over a considerable extent of the country. He discusses in some detail the resources of the region, and comes to a much more favourable conclusion than Herr Zöller in his work on the German African protectorates. There is a good map of the region and of the lower Volta.

Matthews, J. W.—*Incwadi Yami; or, Twenty Years' Personal Experience in South Africa*. London, Sampson Low & Co., 1887: 8vo., pp. 542, illustrations. Price 14s. [Presented by the Publishers.]

In the opening chapters the author gives an account of his experiences in Natal while acting as District Surgeon of Victoria County. In this capacity exceptional opportunities were afforded him of becoming acquainted with the customs of the natives, a subject which is dealt with in a separate chapter. The volume, however, principally deals with the Diamond Fields, where the author subsequently settled, and on the subject of which he has a great deal to say. The concluding chapters are descriptive of a visit to the Kaap Gold Fields. There is no index.

South African Republic.—*La République sud-africaine*. Bull. Soc. Géogr. Commerc. Paris, t. x., 1887-88, No. 5, pp. 537-42. 8vo, Paris, 1888.

Tissot, Charles.—*Exploration Scientifique de la Tunisie. Géographie Comparée de la Province Romaine d'Afrique. Tome second. Chorographie. — Réseau Routier. Ouvrage publié d'après le manuscrit de l'auteur. Avec des Notes, des additions et un Atlas, par Solomon Reinach. Paris, Imprimerie Nationale, 1888: 4to., pp. xxxviii. and 868.*

This is the second and concluding volume of the late M. Tissot's great work on Roman Africa, the first volume of which was noticed in the 'Proceedings,' vol. vii. p. 555. In the present volume M. Reinach gives a very full account of the life and labours of his friend M. Tissot. In the first section of this volume the history of Roman Africa is brought down to the Byzantine period. The second part deals with the chorography of the region, and goes over the whole country by routes, to the minutest detail, referring to every point of interest, geographical, historical, and antiquarian. The work is a monument of learning and research.

AMERICA.

Agassiz, Alexander.—*A Contribution to American Thalassography. Three Cruises of the U.S. Coast and Geodetic Survey Steamer Blake in the Gulf of Mexico, the Caribbean Sea, and along the Atlantic Coast of the United States from 1877 to 1880. Boston and New York, Houghton, Mifflin & Co.; London, Sampson Low & Co., 1888: 2 vols. 8vo.; vol. i., pp. xxii. and 314; vol. ii., pp. [iv.] and 220. Price 42s. [Presented by the Publishers.]*

For several years the U.S. Coast Survey have been carrying out a thorough examination of the seas on the east coast, and in the Gulf of Mexico. Prof. Agassiz made three cruises (1877–80) with the survey parties in the steamer *Blake*, during which he had opportunities of collecting observations on the same plan as those which have been so fruitful in the case of the *Challenger* expedition. The results are described in these two volumes, and are of the richest character, both with respect to biology and physical geography. In working out the special results, especially biological, Mr. Agassiz has had the assistance of several of those eminent specialists who have contributed to the *Challenger* publications. In the introduction Mr. Agassiz gives a brief sketch of the plan of the cruises and some useful notes on the various West India islands which he visited. In the first chapter the equipment of the *Blake* is described, and in the second we have a useful historical sketch of deep-sea work. Then comes a chapter on the Florida reefs, full of suggestion and information as to the origin and structure of West India coral reefs, and as to the formation of the North American continent. Equally so is the following chapter on the topography of the eastern coast of the North American continent, where Mr. Agassiz rightly insists that the true edge of the continent is the edge of the 100 fathom plateau, "the continental shelf," on which it rests, and which has essentially the outline of the visible coast. In another instructive chapter Mr. Agassiz discusses the highly important subject of the permanence of continents and of oceanic basins. Here we have an admirable sketch of the evolution of the American continent. "The geological structure of the different islands of the world enables us to judge whether they are mere volcanic peaks, the highest points of districts subject to cataclysmic local elevation, or whether they are parts of larger masses of land first built up by sedimentary deposits, and gradually reduced by denudation to their present size—the remains, in fact, of great submarine banks, indicating, in a certain measure, the land. The extent of this denudation has been calculated in some cases; and so powerful is its agency that, if carried on during long periods of time, it may transform oceanic regions into continental masses, and the reverse. This may have been the case in the earliest periods of the formation of the earth's crust, when the precipitation was much greater than now; but we have as yet no evidence of any such transportation of continental masses and of oceanic basins since the mesozoic period. If such prearchæan continents existed, they, like the continents from which the materials for the mesozoic and tertiary deposits were derived, have left no traces." Other chapters in the first volume deal with deep-sea formations, deep-sea fauna, pelagic flora and fauna, tempera-

ture of the Caribbean, Gulf of Mexico, and Western Atlantic, the Gulf Stream, submarine deposits, and the physiology of deep-sea life. In the chapter on the Gulf Stream Mr. Agassiz gives an instructive history of our knowledge of that remarkable current, illustrated by reproductions of early diagrams. With regard to the rate of the current Mr. Agassiz writes :—"The Gulf Stream flows at the rate of about one-fourth of a mile an hour through the Yucatan Channel, which is 90 miles wide, and over 1000 fathoms deep. Through the Straits of Bimini it has a velocity of from four to five knots, a width of 50 miles, and an average depth of 350 fathoms. This velocity rapidly decreases as we go north. Off St. Augustine it is rarely more than four miles; from thence to New York it decreases to 2½ miles per hour; off the banks of Newfoundland it is reduced to 1½ or 2 miles per hour; and at a distance of 300 miles to the eastward the velocity of the Gulf Stream, which has constantly been spreading out fan-shaped, is scarcely perceptible." The second volume is occupied with a series of valuable special monographs of the various deep-sea types collected. The volumes are profusely illustrated with maps, charts, sections, diagrams, and woodcuts of the various forms of life collected.

[America, United States].—Annual Report of the Chief Signal Officer of the Army to the Secretary of War for the year 1886. Washington, Government Printing Office, 1886: 8vo., pp. 500, plates. [Presented by Brig.-Gen. A. W. Greely, Chief Signal Officer, U.S. Army.]

California State Mining Bureau. William Irelan, Jr., State Mineralogist. Seventh Annual Report of the State Mineralogist. For the year ending October 1, 1887. Sacramento, 1888: 8vo., pp. 315.

Dawson, George M.—Notes and Observations on the Kwakiol People of Vancouver Island. From the Transactions of the Royal Society of Canada, Vol. V., Section II., 1887. Montreal, Dawson Bros., 1888: 4to., pp. 36, plate. [Presented by the Author.]

Henshaw, Henry W.—Perforated Stones from California. Washington, Government Printing Office, 1887: 8vo., pp. 34, illustrations.

Holmes, William H.—The Use of Gold and other Metals among the Inhabitants of Chiriqui, Isthmus of Darien. Washington, Government Printing Office, 1887: 8vo., pp. 27, illustrations.

Pilling, James Constantine.—Bibliography of the Eskimo Language. Washington, Government Printing Office, 1887: 8vo., pp. v. and 116.

—Bibliography of the Siouan Languages. Washington, Government Printing Office, 1887: 8vo., pp. v. and 87.

Powles, L. D.—The Land of the Pink Pearl, or Recollections of Life in the Bahamas. London, Sampson Low & Co., 1888: 8vo., pp. xi. and 321. Price 10s. 6d. [Presented by the Publishers.]

Although Mr. Powles has written this book to air a grievance of his own upon the merits of which it is not our place to pronounce, he has much to tell which is a real addition to our knowledge of the Bahamas. From his position as judge he had many opportunities of becoming familiar with the islands and with their inhabitants, especially the latter; so that the book is an entertaining sketch of life in Barbados.

AUSTRALASIA.

Davis, James Davidson.—Contributions towards a Bibliography of New Zealand. Wellington, Lyon and Blair, 1887: 12mo., pp. 77.

McFarlane, [Rev.] S.—Among the Cannibals of New Guinea: being the story of the New Guinea Mission of the London Missionary Society. London, John Snow & Co., 1888: cr. 8vo., pp. 192. Price 5s. [Presented by the Publishers.]

This is the first of a series of manuals giving an account of the different missions connected with the London Missionary Society. The present volume

dealing with the New Guinea Mission contains some useful notes on the geography of the country embraced, and on the manners and customs of the people. It is illustrated by a series of original drawings, and by a map of South-eastern New Guinea, showing the stations of the London Missionary Society.

New South Wales.—Annual Report of the Department of Mines, New South Wales, for the year 1886. Sydney, Charles Potter, 1887: folio, pp. 212, maps, plans, etc. Price 7s. 6d.

[**New Zealand.**]—Reports on the Mining Industry of New Zealand. Wellington, G. Didsbury, 1887: folio, pp. v., 29, and 222, plans, &c.

[—] Statistics of the Colony of New Zealand for the year 1886, with Abstract from the Agricultural Statistics of 1887. Wellington, G. Didsbury, 1887: folio, pp. liv. and 377, tables.

[—] No. 17. Colonial Museum and Geological Survey of New Zealand. James Hector, M.D., C.M.G., F.R.S., Director. Reports of Geological Explorations during 1885, with maps and sections. Wellington, G. Didsbury, 1886: 8vo., pp. xl. and 202.

[—] No. 18. Colonial Museum and Geological Survey of New Zealand. Sir James Hector, K.C.M.G., M.D., F.R.S., Director. Ditto, during 1886–87, with maps and sections. Wellington, G. Didsbury, 1887: 8vo., pp. li. and 270.

Pugh's Almanac, and Queensland Directory, for 1888. Brisbane, Gordon & Gotch, 1888: 12mo., pp. xxxii., 439, and 147, maps. [Presented by the Under-Colonial Secretary, Brisbane.]

[**Victoria.**] Statistical Register of the Colony of Victoria, etc. etc. etc. 1885. Melbourne, John Ferres. Folio, tables.

GENERAL.

Cooper, Augustus.—The Colonies of the United Kingdom. A descriptive and statistical work of reference; containing also some important and serious facts connected with the over-population, distress, and chronic scarcity of employment in England. Third edition, to which is added a Preface, by the Rev. F. Gell, M.A. Brighton, the "Brighton Gazette" Printing Company, and John Beal & Co., 1888: 8vo., pp. 182. Price 2s. [Presented by the Author.]

Corbin, Diana Fontaine Maury.—A Life of Matthew Fontaine Maury. London, Sampson Low & Co., 1888: 8vo., pp. vi. and 326. Price 12s. 6d. [Presented by the Publishers.]

Whatever may now be thought of Maury's theories of oceanic circulation and ocean physics as developed in his well-known 'Physical Geography of the Sea,' it will be admitted that he was one of the pioneers in what is now known as Oceanography. His services, moreover, to organised meteorological observation should never be forgotten, and he may be regarded as virtually the founder of the United States Hydrographic Department, which has since done such excellent work. In many other ways did Maury do much to promote the interests of science on both sides of the Atlantic, so that his life well deserves to be written. His daughter does not enter into great detail on these aspects of her father's life. The narrative is mainly a personal one, and gives a satisfactory idea of Maury's character, of his various personal relations, and of his life as a citizen of the States during a trying period of their history. Maury was descended from good families, French and English, on both sides, and was born in Tennessee in 1804. At an early age he entered the navy, and at once began to make observations and to work hard. At the age of thirty-three years he broke his leg, and was thus incapacitated for active service. Fortunately shortly afterwards he was placed in charge of the *Dépôt de Charts and Instruments* at Washington, the institution which he developed into the National

Observatory and the Hydrographical Department. One of the first things he did here was to bring out his Wind and Current Charts, and continued actively to direct and develop this department until 1861, when the Civil War broke out, and Maury felt compelled to throw in his lot with the South. In the end he came to England, where he became well known to scientific circles, and where, in 1866, a testimonial was raised in the form of a handsome sum of money, for Maury had lost his all amid the national troubles. Two years later he returned to the States to fill the post of Professor of Meteorology at the Virginia Military Institute, and here he died in February 1873.

Crawford, Robert.—*Reminiscences of Foreign Travel.* London, Longmans & Co., 1888: cr. 8vo., pp. xx. and 308. Price 5s. [Presented by the Publishers.]

An account of the author's experiences in various parts of the world, including Canada, Austria and Germany, Sardinia, Egypt, Turkey, the River Plate, and Algeria. No dates are given, neither is there an index.

[**Geodetic Institute.**—Publication des Königl. Preuss. Geodätischen Instituts. *Astronomisch-Geodätische Ortsbestimmungen im Harz. Bestimmung der Polhöhen und der Geodätischen Lage der Stationen: Blankenburg, Hüttenrode, Hasselfelde und der Polhöhe von Nordhausen. Im Jahre 1881, . . . Ausgeführt von Dr. Moritz Löw.* Berlin, P. Stankiewicz, 1882: 4to., pp. 32.

[—] Ditto. *Astronomisch-Geodätische Arbeiten in den Jahren 1881 und 1882. Instruction für die Polhöhen und Azimuthbestimmungen.* Berlin, P. Stankiewicz, 1883: 4to., pp. vii. and 232.

[—] Ditto. Ditto, in den Jahren 1883 und 1884. *Bestimmung der Längendifferenzen Berlin—Swinemünde, Kiel—Swinemünde, Swinemünde—Königsberg, Königsberg—Warschau und Berlin—Warschau. Bestimmung der Polhöhe des Zeitballes in Swinemünde.* Berlin, P. Stankiewicz, 1885: 4to., pp. vi. and 202.

[—] Veröffentlichung des Königl. Preussischen Geodätischen Instituts. *Astronomisch-Geodätische Arbeiten I. Ordnung. Telegraphische Längenbestimmungen in den Jahren 1885 und 1886.* Berlin, P. Stankiewicz, 1887: 4to., pp. vi. and 216.

[The above publications were presented by the Director of the Royal Geodetic Institute.]

Habenicht, Hermann.—*Ueber das Woher und Wohin des gegenwärtigen geophysischen Zustandes.* Wien, Pest, Leipzig, A. Hartleben, 1888: 8vo., pp. 16, map.

Watson, [Major] C. M.—*Comparative Vocabularies of the Languages spoken at Suakin: Arabic, Hadendoa, Beni-Amer.* Society for Promoting Christian Knowledge, 1888: sm. 4to., pp. (16). [Presented by the Author.]

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Alpen-Karte von Chr. Michel. Westliches Blatt. Schweiz mit den angrenzenden Theilen von Baden, Württemberg, Vorarlberg, Italien, Frankreich und vom Elsass. Scale 1 : 600,000 or 8·2 geographical miles to an inch. München, 1887, J. A. Finsterlin. Price 2s. 6d. (*Dulaue*.)

England.—Map of —. Scale 1: 520,000 or 7·5 geographical miles to an inch. Constructed and engraved by W. & A. K. Johnston, Edinburgh and London.

This is a boldly drawn school map, on which the populations of cities and towns are indicated by means of symbols, cathedral and county towns being farther distinguished. No railways have been laid down, and this is certainly an omission which improves the map, as, in the neighbourhood of large towns where the lines were numerous they could only tend to disfigure the map, and confuse the children who are being instructed.

Europa.—Klimatologische Wandkarte von —. Scale 1: 3,000,000 or 41·6 geographical miles to an inch. Von C. Coordes und K. Bamberg. Berlin, Chun. 16 sheets. Price 1l. (*Dulau.*)

Italy.—Reisekarte von Ober-Italien und den benachbarten Gebieten von Frankreich und Oesterreich, sowie dem grössten Theile der Schweiz. Scale 1: 900,000 or 12·4 geographical miles to an inch. Bearbeitet von R. Leuzinger. J. Wurster & Co., Geographischer Verlag, Zürich, 1888. Price 3s. 6d. (*Dulau.*)

ORDNANCE SURVEY MAPS.

Publications issued during the month of May 1888.

1-inch—General Maps:—

ENGLAND AND WALES: New Series. Sheet 221 (outline).

6-inch—County Maps:—

ENGLAND AND WALES: **Anglesey**: 1 N.E., 3 S.E., 7 S.E., 11 S.E., 17 S.E.; 1s. each. **Brecknockshire**: 4 N.W., 8 S.W., 14 N.E., 41 S.W., 42 S.W., 43 N.E., 44 S.W.; 1s. each. **Cardiganshire**: 35 N.W., 1s. **Carmarthenshire**: 2 N.W., 32 N.E., 46 S.W.; 1s. each. **Cornwall**: 18 S.E., 39 S.E., 40 S.W., 49 N.W., S.E., 56 N.E., 57 S.W., 58 N.W., 64 N.E., 68 N.W., 70 N.E., 71 S.E., containing Falmouth, 75 S.E., 76 N.W., S.W., 79 N.W., 80 N.W., 81 N.W., N.E., S.W., 84 S.E., 85 N.W. and S.W. on one sheet; 1s. each. **Devonshire**: 8 N.W., 9 N.W., S.E., 42 N.W., S.W., 53 N.W., N.E., 101 N.W.; 1s. each. **Dorsetshire**: 50 S.W., 56 N.E., S.W., 59 N.W., N.E.; 1s. each. **Gloucestershire**: 54 N.W.; 1s. **Herefordshire**: 49 N.W., 52 S.E., 54 S.E.; 1s. each. **Lincolnshire**: 31 N.W., N.E., S.W., S.E., 56 N.E., 66 N.W., S.W., 70 N.E., containing Lincoln, 104 N.E., 114 S.E., 116 N.W., S.W., S.E., 117 N.W., N.E., S.W., S.E., 118 N.W., 125 N.E., 127 N.E., 128 N.W.; 1s. each. **Merionethshire**: 20 S.E., 27 N.E., 36 N.W., S.E., 37 N.W., N.E., 44 S.W.; 1s. each. **Montgomeryshire**: 2 S.W.; 1s. **Montgomeryshire** is now complete on the 6-inch scale in 175 quarter-sheets, at 1s. each. **Pembrokeshire**: 8 S.W., 15 S.E., 20 N.E., S.W., 21 S.E., 44 N.E.; 1s. each. **Radnorshire**: 21 S.W.; 1s. **Somersetshire**: 47 N.W., S.W., 68 N.W.; 1s. each. **Staffordshire**: 70 N.W.; 1s.

25-inch—Parish Maps:—

ENGLAND AND WALES: **Brecknockshire**: XIII. 12, 16, XXI. 3, 8, XXII. 11, 16, XXIII. 12, 15, 3s. each; XXXIV. 2, 4s.; XXXVI. 6, 3s. **Cambridgeshire**: I. 14, 3s.; I. 15, V. 11, VII. 6, 6, 4s. each; XX. 12, 5s.; XXXI. 1, 4s.; XXXI. 3, 4, 5, 3s. each; XXXI. 6, 7, 4s. each; XXXI. 8, 3s.; XXXI. 9, 14, 4s. each; XXXI. 16, 3s.; XXXI. 11, 4s.; XXXI. 15, 3s.; XXXIII. 1, 5s.; XXXIV. 3, 4, 5, 6, 7, 8, 14, 15, XL. 10, XLVII. 4, 5, 3s. each; XLVII. 7, 4s.; LIII. 10, LVII. 2, 6, 15, 16, LXII. 3, 4, 3s. each. **Cardiganshire**: II. 1, 2, 3s. each; III. 5, 4s.; II. 9, 3s.; VI. 14, 4s.; VII. 13, 14, IX. 4, and X. 1, on one sheet; IX. 16, X. 1, on IX. 4, X. 10, XII. 10, XIV. 7, 11, 3s. each; XIV. 14, 4s.; XIV. 16, XV. 10, XLIII. 1, 3s. each. **Carmarthenshire**: X. 1, 5, 9, 10, 12, 14, 16, 3s. each; XL. 4, 4s.; XL. 16, 3s. **Devonshire**: XII. 4, 4s.; XII. 8, 3s.; XII. 10, XIII. 11, 12, 14, 4s. each; XXI. 9, 13, LXV. 12, 15, LXXVII. 3, 3s. each; LXXVII. 7, 4s.; LXXVII. 8, CXV. 4, 3s. each; CXV. 7, 8, 9, 4s. each; CXV. 15, CXXI. 12, CXXVII. 5, 6, 9, 13, 14, 3s. each. **Dorsetshire**: VI. 12, VIII. 8, X. 15, XI. 4, 3s. each; XI. 6, 7, 4s. each; XI. 8, 3s.; XI. 11, 4s.; XI. 12, 3s.; XI. 15, 4s.; XI. 16, XVI. 9, 11, 16, XX. 5, XXIV. 6, 15, XXV. 1, 2, 5, 6, 3s. each; XXV. 9, 4s.; XXV. 9, 10, 11, 12, 13, 14, 15, XXVI. 2, 9, 13, 14, XXXIII. 2, 3, 4, 6, 7, 8, 9, 10, 12, 13, 3s. each. **Herefordshire**: XXXIV. 10, 4s.; XXXVII. 12, XXXVIII. 16, 3s. each; XXXIX. 9, XL. 2, 4s. each; XL. 3, 4, 8, 13, XLII. 5, XLIV. 7, XLV. 1, 5, 6, XLVIII. 6, 3s. each. **Huntingdonshire**: XXI. 9, 3s.; XXIII. 1, 5s.; XXV. 2, 3s. **Leicestershire**: XXXV. 15, 3s. **Lincolnshire**: IV. 13, VIII. 1, 11, 15, XXX. 1, 2, 4, 13, XXXIX. 6, 10, XLVII. 1, 2, 5, 9, 10, 14, LV. 1, 2, 12, 13, 15, 16, LXIV. 3, 4, 7, 8, 9, LXXIX. 2, 3, 3s. each; LXXIX. 4, 4s.; LXXIX. 5, 6, 7, 9, 3s. each; LXXIX. 10, 4s.; LXXIX. 11, 12, 13, 16, LXXXVII. 1, 2, 3, 4, 5, 6, 9, 10, 12, 14, 3s. each; LXXXVII. 15, 4s.; XCVII. 2, 4, 8, 3s. each; XCVII. 11, 12, CXIII. 12, CXIII. 1, 6, 4s. each; CXXXIX. 6, CXL. 5, 6, 9, 10, 3s. each; CXXI. 3, 4, 8, 9, 13, 15, 4s. each; CXXI. 16, 3s.; CXLII. 3, 4s.; CXLII. 10, 5s.; CXLII. 14, CXLIII. 2, 3, 4, 9, 10, 4s. each; CXLV. 3, 3s.; CXLVI. 13, CXLVIII. 2, 17, 18, CXLIX. 10, 4s. each. **Merionethshire**: XLVII. 3, 7, 8, 10, XLIX. 1, 2, 3s. each; XLIX. 5, 4s. **Montgomeryshire**: XXV. 7, 8, XXVII. 10, XXVIII. 1, 2, 3s. each. **Norfolk**: Area Books: Poringland, Ranworth with Panzworth, South Walsham St. Lawrence, South Walsham St. Mary, Sprowston, Thetford St. Cuthbert (part of), Thetford St. Mary (part of), Thetford St. Peter, Thorpe next Norwich, Thurton, Trowse with Newton, Whittingham; 1s. each. **Rutlandshire**: VI. 3, 3s.; VII. 13, 4s. **Somersetshire**: XXX. 16, XXXVI. 11, XLI. 8, XLIII. 4, 3s. each; XLIII. 8, 4s.; XLVIII. 3, 4, 8, 13, 14, 3s. each; XLIX. 4, 6, 12, 4s. each; XLIX. 15, 16, LXXXIV. 12, 3s. each; LXXXIX. 9, XC. 5, 6, 4s. each; XCIII. 5, 3s. **Staffordshire**: Area Books: Canwell, 1s.; Hints, 1s.; Shenstone, 2s.; Tamworth (part of), 2s.; Weeford, 1s. **Suffolk**: Area Books: Charsfield, Clopton, Dallingham, Dallinghamfield, Debach, Otley, Swilland, Thetford St. Cuthbert (part of), Thetford St. Mary (part of), Withnessam; 1s. each. **Warwickshire**: V. 11, 12, 3s. each; V. 15, IX. 9, 11, 4s. each; IX. 13, 3s.; IX. 15, XIV. 4, 16, XV. 9, 4s. each; XVI. 9, XVII. 2, 10, 11, 12, 3s. each; XVII. 14, 4s.; XVII. 16, 3s.; XIX. 15, 4s.; XXI. 14, 3s.; XXV. 1, 4s.; XXXIII. 5, XL. 3, 3s. each; XL. 7, 5s.; XL. 8, LIV. 9, 3s. each. **Wiltshire**: LIII. 16, 3s. **Worcestershire**: VI. 4, 16, XXXIX. 8, 4s. each; LII. 9, 3s.

Town Plans—10-foot scale:—

ENGLAND AND WALES: Atherstone, VI. 11, 16, 21; VI. 15, 1, 2, 3; 2s. each. Birmingham and environs, XIII. 12, 5, 10; 2s. each. Brecon (Aberhonddu), XXVIII. 9, 21; XXVIII. 13, 2, 7, 8; 2s. each. Cambridge, XLVII. 3, 2, 6, 17; XLVII. 6, 14, 16; 3s. each. XLVII. 2, 22; XLVII. 3, 16, 22; XLVII. 6, 5, 10; 4s. each. XLVII. 3, 21; 5s. XLVII. 2, 13; 6s. 6d. Dartmouth, CXXVII. 16, 5, 14; CXXVIII. 13, 6; 2s. each. Horncastle, LXXIII. 10, 20, 24; LXXIII. 11, 16. (*Stanford, Agent.*)

ASIA.

Burma.—Map of —. Scale 1 : 950,000 or 13 geographical miles to an inch. Constructed by W. & A. K. Johnston, Edinburgh and London.

This map is drawn in a style well suited for use in schools; it appears to have been carefully compiled and brought up to date. The hills are shaded in brown chalk, and the lettering is bold and distinct.

AFRICA.

Africa.—Die Fortschritte der Afrikaforschung, 1788–1888. Von Alexander Supan. I.: 1788–1880. II.: Stand im Jahre 1888. Petermann's 'Geographische Mitteilungen,' Jahrgang 1888, Taf. 10 u. 11. Gotha, Justus Perthes. (*Dulau.*)

Cape Colony.—Map of Police Districts, 1887. Scale 1 : 627,800 or 8·6 geographical miles to an inch. Lithographed in the Surveyor-General's Office. Printed by W. A. Richards & Sons, Cape Town. 6 sheets.

AMERICA.

Argentine Republic.—Mapa de la República Argentina y de los Países contiguos, compilado por J. Duclout. Publicado por Ernst Nolte, Libreria Alemana, Buenos Aires, 1888. Scale 1 : 4,000,000 or 55·5 geographical miles to an inch. (*Dulau.*)

This is a carefully compiled map, on which all means of communication are laid down, together with the positions and extent of the agricultural colonies that have been formed in the various provinces and governments. The north-eastern departments of the province of Buenos Ayres are given on an enlarged scale, on an inset map; and taken altogether, the map is a very useful one for the purposes of general reference.

AUSTRALASIA.

Australien.—Neue Karte von —, von Prof. Fr. Behr. Scale 1 : 12,500,000 or 171·2 geographical miles to an inch. Verlag von Julius Maier in Stuttgart, 1888. Ausgeführt in der Lith. Anst. v. J. Mann, Cannstatt. Price 6s. (*Williams & Norgate.*)

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in March and April 1888.

No.	Inches.	
1078.. .. .		The World, showing tracks followed by vessels with sail and auxiliary steam power, 3s. 6d.
1073	m = 5·0	France, north coast:—Dieppe, 1s.
1093	m = 10·0	Italy, west coast:—Civita Vecchia, 1s.
1086	m = 0·35	Mediterranean, Archipelago:—Gulf of Kassandra to Thaso and Lemnos islands, 2s.
1087	m = 0·35	Mediterranean, Archipelago:—Thaso Island to Dardanelles, 2s.
318	m = 1·4	North America, St. Lawrence river:—The Traverses, 2s.
533	m = 1·5	South America, north coast:—Georgetown and mouths of Demerara and Essequibo rivers, 2s. 6d.
1089	m = 0·5	Arabia, east coast:—Masira channel, 1s. 6d.
1095	m = 0·73	Australia, north coast:—Clarence strait, 2s. 6d.
1108	m = 2·0	New Zealand, North island:—River Thames, 1s.
2647	.. .. .	France, west coast:—Plan added, Port Breton.

(*J. D. Potter, Agent.*)

CHARTS CANCELLED.

No.	Cancelled by	No.
158 Plan of Civita Vecchia on this chart	New plan, Civita Vecchia	1093
318 North and Middle Traverses ..	New plan, The Traverses	318
533 Georgetown and mouths of Demerara and Essequibo rivers	New plan, Georgetown and mouths of Demerara and Essequibo rivers	533

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 1491. England, east coast:—Harwich harbour. 1772. Ireland, south coast:—Approaches to Wexford harbour. 262c. Channel islands:—Guernsey, Herm, and Serk. 2307. Norway, west coast:—Smølen island to Svee fjord. 201. Adriatic sea:—Gulfs of Venice and Trieste. 527. South America, north coast:—Approaches to Demerara and Essequibo rivers. 1801. South America, north coast:—Trinidad to Surinam. 2898. Gulf of Mexico:—St. George sound, Middle and West entrances. 1155. South America, north coast:—Corentyn river. 622. Africa, west coast:—Bonny and New Calabar rivers. 1695A. Australia, south coast:—Great Sandy strait, southern portion. 2349. Australia, north-east coast:—Magnetic island to Double point. 2764. Australia, north-east coast:—Coral sea and Great Barrier reefs. 2123. New Guinea, south coast:—Orangerie bay to Bramble haven. 1111. South Pacific Ocean:—Hao island.

(*J. D. Potter, Agent.*)

Danish Charts.—Östersöen mellem Falsterbo og Dars. 1884. Rettet til 1886, 87, 88.—Kjöbenhavn med Löbene Dertil 1882. Rettet til 1883, 84, 86, 87, 88. Scale 1:40,000.—Kattegattet, 1886. Rettet til 1887, 88.—Skagerrak, 1871. Rettet til 1880, 81, 82, 83, 84, 85, 86, 87, 88.—Nordsöen, Jyllands Vestkyst med Opgangen til Skagerrak, 1882. Rettet til 1885, 87, 88.—Nordvestkysten af Grönland, fra 66° 30' til 74° 45' N. Brede. 1888.—Vestkysten af Grönland fra Artuk til Holstensborg, 61° til 67° N. Brede. 1887.—Grönland med Omgivelser, 1888, 2 sheets. Søkaart Archiv, Kjöbenhavn. (*Dulau.*)

United States Charts.—No. 1060. Punta Arenas anchorage (Gulf of Nicoya), west coast of Costa Rica. Price 1s. 6d.—1084. Lagoon Head anchorage, west coast of Lower California. Price 10s.—1085. Rosario bay and Sacramento reef, west coast of Lower California. Price 1s. 6d.—Pilot Chart of the North Atlantic Ocean, May 1888. Published at the Hydrographic Office, Navy Department, Washington D.C., Commander J. R. Bartlett, U.S.N., Hydrographer to the Bureau of Navigation. 1888.

ATLASES.

Bartholomew, J., F.R.G.S.—Elementary School Atlas. By J. Bartholomew F.R.G.S. Macmillan & Co., London. Price 1s.

In the construction of this atlas a departure has been made from the hard and fast system on which such works have previously been produced in this country, and if the attempt to improve has not in the present instance proved successful, its cause may, we think, be traced to a desire to get too much into a cheap atlas. The six views of the globe given on sheet 1 are well enough in their way, but such lessons ought to be taught with the globe itself. Sheet 2, Europe illustrating geographical terms, is very likely to mislead the student as to the character of the physical geography, as the mountains, &c., are not only roughly, but inaccurately laid down; neither do we think it possible for a child to learn anything with regard to mapping of landscapes from a study of sheet 3. The maps in the other portion of the atlas are rough productions, and with a few exceptions are without any scale, other than the graduation, by which the student can compare one country with another, and even where these scales are

given, they are not well chosen; for instance, in the British Isles we find England drawn on the smallest scale, and Ireland on the largest. The best maps given are those which have reference to the physical geography, and meteorology of the British Isles.

Meteorological.—Charts showing the Mean Barometrical Pressure over the Atlantic, Indian, and Pacific Oceans. Published by the authority of the Meteorological Council. London, printed for Her Majesty's Stationery Office by Eyre & Spottiswoode. Price 10s. 6d.

In this atlas the mean barometric pressure for the months of February, May, August, and November, have been selected to represent that for Winter, Spring, Summer, and Autumn respectively in either hemisphere. The observations on which these charts are based are derived from logs and documents deposited at the Meteorological Office, information gathered in Her Majesty's ships and furnished by the Admiralty, as well as from the published narratives of voyages made between the years 1785 and 1879; valuable material has also been derived from the publications of the Hydrographic Office, Washington D.C. The number of observations which have been obtained from the Meteorological Office logs exceeds half a million.

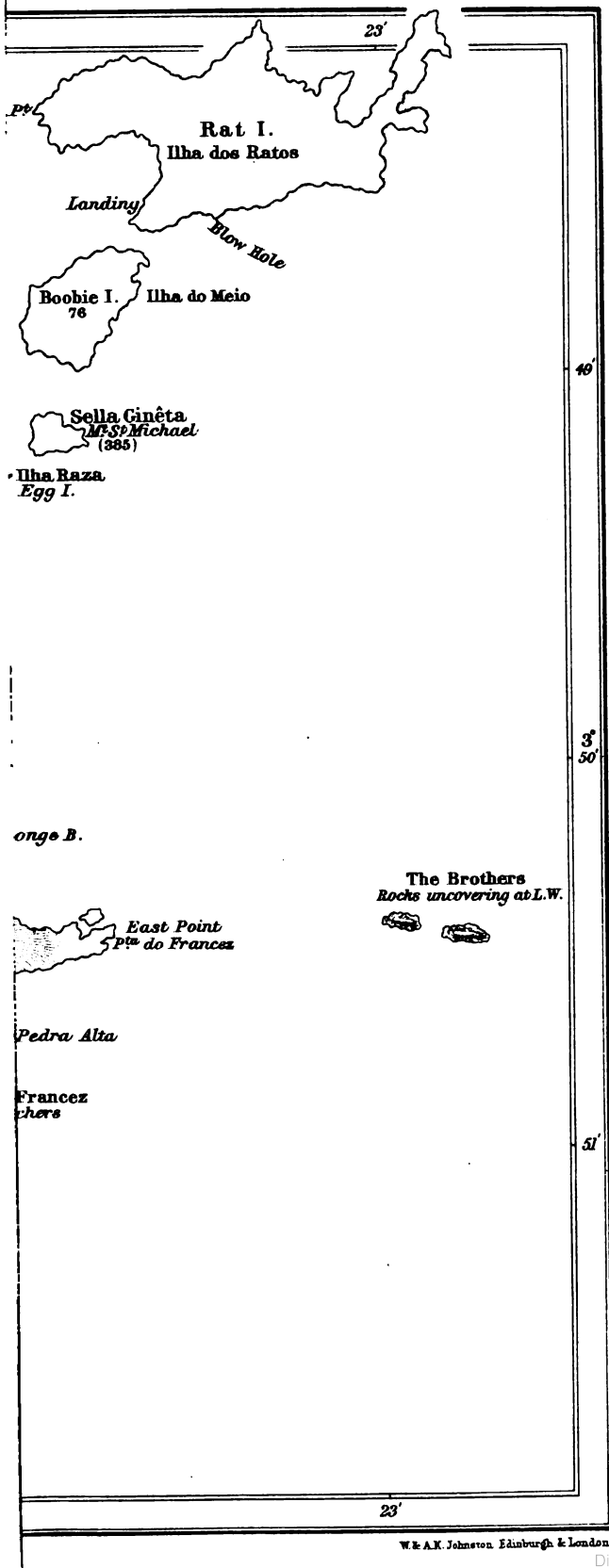
On the principal charts, the barometric means for areas of 5° of latitude and 5° of longitude are given in large figures; those for areas of 2° being indicated by smaller figures. The range to the nearest tenth of an inch for each 5° area is placed over the mean for that area, and the number of days' observations under it. At coast stations and islands the mean pressure is also given, and under it the number of years for which observations were available. When the means given on the charts have been derived from foreign sources or institutions, the fact is made known by a distinguishing letter. All observations have been corrected for a constant altitude of 11 feet above the sea, and reduced to 32° F.; this necessitates the application of a correction to the readings of a barometer before it can be compared with the figures given on the charts, and to facilitate this a table is given on each sheet; and as no correction for gravity has been applied, a table for this purpose is also given.

At the end of the atlas eight smaller maps are given, four of which exhibit isobars for the four seasons over the entire globe, and the remaining four show the range of barometric pressure. All the charts have been compiled and drawn by Nav. Lieut. C. W. Baillie, R.N., F.R.A.S.

Saint-Martin, M. Vivien de.—Atlas Universel de Géographie Moderne, Ancienne et du Moyen Age, construit d'après les sources originales et les documents les plus récents, cartes, voyages, mémoires, travaux géodésiques, etc., avec un Texte Analytique, par M. Vivien de Saint-Martin et Fr. Schrader. Environ 110 cartes, gravées sur cuivre sous la direction de MM. E. Colin et Delaune. 8° Livraison. Contenant: Nos. XII et XIII, France en 6 feuilles. Scale 1:1,000,000. Feuilles I et II.—No. LXXV, Antilles. Scale 1:5,600,000. Paris, Hachette & Cie. Price 5s. (*Dulau.*)

This is the eighth part of the Atlas. It contains the two first sheets of a six-sheet map of France, which will also include a considerable portion of the adjacent countries. The other map is one of the West India Islands, and a part of the Spanish Main, on which the depths of the ocean, and the elevations above sea-level are given. Like all the maps of this atlas which have heretofore been published, they are beautiful specimens of cartography, and it is only to be regretted that the issues are not more frequent and punctual.

Schweiz.—Topographischer Atlas der — im Maasstab der Original-Aufnahmen nach dem Bundesgesetze vom 18. Dezember 1868, durch das eidgenössische Stabsbureau unter der Direktion von Oberst Siegfried veröffentlicht. XXXII. Lieferung: Nr. 186, Münster. 189, Eschenbach. 190, Cham. 192, Meierskappel. 195, Eriswil. 197, Luthern. 223, Trogen. 225, Kobelwald. 241, Salez. 242, Richterswil. 244, Altmatt. 257, Sevelen. Bern, Schmid, Francke & Cie. (vormals Buchhandlung Dalp, Bahnhofplatz). Price 12s. 6d. (*Dulau.*)



THE KAAP GOLDFIELDS, from Jeppe's new Map of the Transvaal & surrounding Territories.



ROYAL GEOGRAPHICAL SOCIETY

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by Colonel H. H. GODWIN-AUSTEN, F.R.S., J. K. LAURENCE, M.A., and DOUGLAS W. FRESHFIELD, M.A. Contents: Hints on Surveying. Astronomical Observations. John Coles, F.R.A.S.—Meteorology. R. St. John, F.R.S.—Geology. W. T. Blanford, F.R.S.—Natural History. H. W. Bates, Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.—Astronomy. E. B. Tylor, D.C.L., F.R.S.—Photography. W. F. Donkin, M.A.—Hints. G. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department. General Outfit. Colonel J. A. Grant, C.B., Edward Whymper, and others. Published in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, and to be had of Edward Stanford, 55, Charing Cross, S.W.

Instruction for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. **Surveying and Mapping**, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. **Field Training**, including practical training in the field. By Mr. W. Topley, of the Geological Survey; President of the Geologists' Association. 3. **Botany**. By Mr. N. E. Phillips, Herbarium, Kew. 4. **Photography**. By Mr. John Thomson, A.R.S.P. 5. **Graphic Illustrations of China and its People**, and other works. Lessons are given on days and at hours arranged between the Instructor and the pupil. The fee to pupils is, for each lesson of an hour, 2s. 6d. Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers, Vol. II. Part 2.—Now Ready.—CONTENTS:—**Geography of Algeria**. By Lieut.-Colonel Sir ROBERT LAMBERT PLAYFAIR, Consul-General, Algiers.

Fellows who have not applied for the Parts as published, can have them by applying at the offices of the Society, 1, Savile Row, W.

LIMMER'S HOTEL, CONDUIT STREET, W.

This old-established Hotel, situated in the centre of the most fashionable part of London—being mid-way between Bond Street and Regent Street—contains every convenience for the accommodation of **FAMILIES** and Gentlemen.

The Banqueting Hall is specially adapted for Military and other Dinners, and Wedding Breakfasts.

Address—**THE PROPRIETOR.**

SCHOOL-SHIP CONWAY, LIVERPOOL,

For training young gentlemen in the Merchant Service. H.M.S. 'Nile,' ninety guns, age of Her Majesty the Queen, a Gold Medal to be competed for by the Cadets. The Admiralty give ten appointments yearly as Midshipmen, R.N. and are given yearly by the



men to become **OFFICERS**. This vessel, formerly is under the direct patronage of the Queen, who gives annually prizes for by the Cadets. appointments yearly as R.N.R., and valuable prizes India Office, the Trinity

House, and Royal Geographical Society. Inclusive term 50 Guineas. For Prospectus, apply to the Captain, Archibald T. Miller, R.N., F.R.G.S., as above.

Authors are alone responsible for their respective statements. In MS. communications all new or unfamiliar geographical names should be written in imitation of Roman type.

VOL. X., No. 8.
New Monthly Series.]

AUGUST, 1888.

[To Non-Fellows,
PRICE 1s. 6d.]

PROCEEDINGS

OF THE

Royal Geographical Society

AND

Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE		PAGE
A JOURNEY ACROSS CENTRAL ASIA, FROM MANCHURIA AND PEKING TO KASHMIR, OVER THE MUSTAGH PASS. By Lieut. F. E. YOUNGHUSBAND, King's Dragoon Guards	485	GEOGRAPHICAL EDUCATION: THE YEAR'S PROGRESS AT OXFORD	531
UNEXPLORED BASUTO LAND. By Lieut. Colonel Sir MARSHALL CLARKE, K.C.M.G., H.M. Commissioner for Basuto Land	519	GEOGRAPHICAL NOTES	533
ON THE INFLUENCE OF ARAB TRADERS IN WEST CENTRAL AFRICA. By Lieut. H. WISSMANN, Gold Medallist, R.G.S.	525	REPORT OF THE EVENING MEETINGS	536
		NEW GEOGRAPHICAL PUBLICATIONS	538
		NEW MAPS	545

MAPS.

CENTRAL ASIA, ILLUSTRATING LIEUT. YOUNGHUSBAND'S ROUTE (will appear in the September Number).	
BASUTO-LAND	548

LONDON: EDWARD STANFORD, 55, CHARING CROSS, S.W.
PARIS: ANDRÉ GOUJON. **MANCHESTER: JOHN HETWOOD.** **LEIPZIG: F. A. BROCKHAUS.**
VIENNA: ARTARIA & Co. **EDINBURGH: DOUGLAS & FOULIS.** **NEW YORK: SCHINER & WELFORD.**
HAMBURG: L. FRIEDERICHSEN & Co. **DUBLIN: HODGES, FOSTER & Co.** **PHILADELPHIA: LIPPINCOTT & Co.**
ST. PETERSBURG: WATKINS & Co. **BERLIN: D. REIMER.** **MELBOURNE: GEORGE ROBERTSON & Co., LIMITED.**

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR	"
KURRACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

SUMMER TOURS IN SCOTLAND.

GLASGOW and the HIGHLANDS.

(Royal Route via Crinan and Caledonian Canals.)

Tourists' Special Cabin Tickets issued during the Season, valid for six separate or consecutive days' sailing by any of Mr. Macbrayne's Steamers, £3.

THE ROYAL



MAIL STEAMERS

Columba, Chevalier, Mountaineer, Glencoe, Clydesdale, Lochiel, Handa, Mabel, Gladiator,
Iona, Grenadier, Pioneer, Claymore, Lochawe, Inveraray Castle, Islay, Lochness, Uda,
Fusilier, Gondolier, Glengarry, Clarsman, Linnet, Cavalier, Fingal, Ethel,
Sail during the season for Kyles of Bute, Ardrishaig, Oban, Ballachulish (for Glencoe), Fort-William, Banavie, Inverness, Staffa,
Iona, Lochawe, Islay, Tobermory, Portree, Stromo Ferry, Gairloch, Lochmarea, Ullapool, Lochinver, Lochnaddy, Tarbert
(Harris), Stornoway, Thurso, Loch Katrina, Loch Lomond, the Trossachs, &c.; affording Tourists an opportunity of visiting
the magnificent scenery of Glencoe, the Cuchullin Hills, Quirang, Loch Coruisk, Loch Scavaig, Lochmarea, the Falls of Foyers,
and the famed Islands of Staffa and Iona. OFFICIAL GUIDE, 3d.; Illustrated, 6d.; Cloth Gilt, 1s. Time Bill, with Map and
Fares, Free by Post from the owner, DAVID MACBRAYNE, 119, HOPE STREET, GLASGOW.

LUXURIANT GLOSSY HAIR

Is assured to those who discard poisonous hair restorers and dyes and cheap oil
which produce eruptions on the scalp, and use

ROWLANDS' MACASSAR OIL.



Known for nearly 100 years as the best Preserver and Beautifier of the Hair
It contains no lead or mineral ingredients, and can now also be had in
GOLDEN COLOUR for fair-haired children.

Sizes, 3s. 6d., 7s., 10s. 6d. (Family bottles equal to 4 small).

Ask Chemists for ROWLANDS', and avoid cheap worthless imitations under similar names.

PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

*A Journey across Central Asia, from Manchuria and Peking
to Kashmir, over the Mustagh Pass.*

By Lieut. F. E. YOUNGHUSBAND, King's Dragoon Guards.

(Read at the Evening Meeting, May 14th, 1888.)

Map, p. 548.

IN the summer of 1885, Mr. H. E. M. James, of the Indian Civil Service, very kindly asked me to accompany him on a journey he was about to make into China, and having decided to go to the north-east portion of the Empire to Manchuria, a country about which so little appeared to be known, we left Calcutta in March 1886, travelled to Peking first, and then to Newchwang,* where we were joined by a member of the Consular Service, Mr. H. E. Fulford, whose thorough knowledge of the language and ready tact and good humour with the natives carried us through many a difficulty. Mr. James, last year, read to you a paper describing this journey, and he has since, in his able work entitled 'The Long White Mountain,' given a fuller account of it, and has told how, after leaving Mukden, we attempted to ascend the Yalu river to its source, and then crossing the watershed, descend the valley of the Tumen river to Hunchun, and that finding this impracticable, we crossed into the valley of the Sungari and ascended that river to its source in the Chang-pei-shan Mountains, the highest point of which we found to be 8000 feet only instead of 12,000 or 15,000 feet as had formerly been supposed. Then descending the valley of the Sungari through most magnificent forests, we reached Kirin, the most important town in Northern Manchuria. From there we passed through the richly cultivated undulating country bordering the Sungari to Petuna, and after crossing that river, passed over an open prairie country to Tsi-tsi-har, from which place we struck back again to Sansing, and then ascended the Hurka river to Ninguta, and crossed the northern end of the Chang-pei-shan Mountains, here only some 2000 feet high, to Hunchun and Possiet Bay. We then headed back to Kirin again, and from thence through Kuan-

* *Vide* Map of Manchuria, 'Proceedings R.G.S.,' 1887, p. 594.

cheng-tzu to Mukden and Newchwang, which we reached on December 19th, just seven months after leaving it.

It was on our way to Mukden that we saw one of the prettiest sights it is possible to imagine. As usual, we had started very early in the morning—three or four o'clock—snow was lying on the ground, and the thermometer was several degrees below zero, when, as the sun rose, we saw the whole atmosphere glistening with shining particles. We were in a frozen mist, and every tree and shrub, every branch and twig, was encrusted on all sides with the glittering particles. Earth and air alike were sparkling white, and the delicate tracery of the trees, the glistening atmosphere, and the snowy hills in the background, made up a scene such as one could scarcely hope to meet with except in fairyland.

Our work of exploration was now over, and few countries could repay the traveller better for his labours than Manchuria. It is a noble country, and well worthy of being the birthplace of the successive dynasties which, issuing from it, have conquered all the countries round, and of that dynasty which to-day holds sway over the most populous empire in the world.

The fertility of the soil is extraordinary; the plain country is richly cultivated and dotted over with flourishing villages and thriving market towns, and the hills are covered with magnificent forests of oak and elm. The mineral resources are at present undeveloped, but coal and iron, gold and silver are known to be procurable. The climate is healthy and invigorating, but very cold in winter, when the temperature varies from 10° below zero Fahr. in the south to 40° or more below zero in the north.

Rivers are numerous and large; the principal is the Sungari, which is navigable for vessels of three or four feet draught as far as Kirin, and is therefore of considerable importance both strategically and commercially—for should the Chinese permit the Russians to navigate it, the latter would derive immense advantage from having access to such a thickly populated and fertile country as lies on both banks of the river above Sansing, more especially when the Great Siberian Railway has been completed up to the Amur. As Mr. James has pointed out, the basin of the Sungari is of extraordinary fertility, and every year thousands of colonists from the northern provinces of China are flocking into these districts, opening up new tracts and building large thriving villages and towns.

Unfortunately brigandage is very rife in Northern Manchuria; nearly every one carries arms of some sort, and one never sees small hamlets or detached farmhouses, because the people have, for their own protection, to collect together in large villages and towns. And the Chinese must be careful lest a neighbouring Power, actuated of course by the purest of motives, in the interest of the advance of civilisation, does not take upon itself to stop this brigandage.

None of the other rivers of Northern Manchuria approach in importance to the Sungari. The Nonni and the Hurka are navigable for small junks as far as Tsi-tsi-har and Ninguta respectively when the rivers are full, but they pass through districts for the most part unproductive, or at any rate undeveloped. The Tumen river, although it falls directly into the sea, is of no importance, as it flows through a mountainous, thinly populated country, and is not navigable even to Hunchun for anything but very small junks. When we first saw the river, two days' march above Hunchun, we could scarcely believe it could be the Tumen river, as it was so insignificant in comparison with what we had expected. It seems somewhat remarkable that of the three rivers which rise within a few miles of each other in the Changpei-shan, two, viz. the Sungari and the Yalu, should be of such immense size, while the third, the Tumen, should be so comparatively insignificant, and this although it is on the side of the range nearest the sea. I noticed, however, that in the basins of the Sungari and Yalu rivers, in which we were travelling during the rainy season, the rain usually came from the south, and not from the east, that is to say, it came more from the China Seas than from the Sea of Japan.

With regard to the population of Manchuria, perhaps the most noticeable point is the paucity of Manchus inhabiting the country. The original inhabitants seem to have gradually drained off to China Proper, and their places are now being taken by emigrants from the provinces of Shan-tung and Chihli.

Like nearly all conquering nations, the Manchus, from enjoying too much ease and comfort, seem to have lost their old warlike spirit, and in their native country do not bear a reputation for excessive bravery, but are, on the contrary, the laughing-stock of the Chinese colonists; for the Manchu soldiers have proved themselves quite incapable of dealing with the bands of brigands who infest the country, and Chinese regiments composed of men from Hunan and Honan are used against any robber bands who are likely to offer a particularly stubborn resistance.

The inhabitants generally, though at times showing a greater amount of curiosity than was pleasant, were on the whole, well enough disposed towards us, more especially in the remoter districts. Near the Russian frontier we were naturally taken for Russians, and at Hunchun we were much amused at Chinese soldiers coming up to us to shake hands like they had seen Russians do, and greet us with the Russian equivalent for "How do you do?"

Great activity is being shown now in Manchuria in military preparation, and as Mr. James has already told you, an arsenal and powder factory has been constructed at Kirin, and forts, mounting heavy Krupp guns, at Sansing on the Sungari, and Hunchun near Possiet Bay; a telegraph line will now have been completed through Kirin

to Blagovestchensk on the Amur and to Hunchun; some 15,000 additional troops are being raised and large quantities of modern breech-loading rifles are being imported into the country. It seems that the Chinese are anxious to improve their position in Manchuria, and these preparations would no doubt make it very secure if the Chinese soldiers could be induced to refrain from substituting coal-dust for gunpowder in their cartridges, if the Government would see the advantage of having one instead of a dozen patterns of rifle, and thus prevent inevitable confusion in the supply of ammunition; and if the officers knew what discipline meant and what is required of a leader of troops in a war with a civilised Power. Before constructing the arsenal at Kirin, too, the Government might have considered whether the money thus expended for manufacturing arms, which could be obtained of very much better quality and at a third of the price, might not have been better expended in improving the lines of communication and making them fairly passable during the summer months.

From Newchwang Mr. James went through Port Arthur to Chifu, and from there home by America, while Mr. Fulford and myself returned by Shan-hai-kuan to Tientsin. I intended to winter at that place and Peking, and then return to India by sea, but having obtained an extension of leave I determined to travel back to India through Mongolia and Chinese Turkistan.

Mr. Shaw, the first Englishman to penetrate into this latter country, in finishing a description of it, says:—"We have thus brought our imperfect survey round by the south of the Desert of Gobi into the regions concerning which our more accurate knowledge is derived from the eastward. Thus the two sources of light are pushing towards each other, giving good promise that the penumbra still remaining between will soon be dispersed by the rays from one side or the other." My ambition, therefore, was to join together these two sources of light by completing my journey from the eastern coast of Asia till I reached the Himalayas at the western extremity of the Chinese Empire. The route I selected by which to reach Chinese Turkistan from Peking was the most direct one, though the least frequented, and as yet unknown to Europeans. It leads across the Gobi Desert in a line lying between that followed by Mr. Ney Elias in 1872, when he travelled from Peking to North-western Mongolia and Siberia, and the route followed by that prince of travellers, Marco Polo, six centuries ago, in coming from Europe to Peking, the account of whose journey has been so admirably edited by Colonel Yule.

So after enjoying, for nearly three months, the hospitality and kindness for which Sir John and Lady Walsham and the British Legation are so well known, I set out again on the 4th April. But this time I was without companions, and had only one Chinese servant, who

acted as interpreter as well as cook and groom. Well and faithfully did he serve me, and when things went hardest he was most cheerful. Once only did he give in, and that was when he was overcome with mountain sickness: he thought the air was poisonous, and said they had no air "same like that Peking side."

In preparing for so long a journey through an almost unknown country, a great many things have to be thought of, chief of which is the money supply. I found it impossible to get bills on any town in Turkistan, so it was necessary to carry money sufficient for the whole journey with me. It is perhaps not generally known that in China there is no silver coinage, and that the value of two or three sovereigns in the copper coinage would be a mule-load. It is necessary therefore to take solid silver, which is weighed out as occasion requires, and I set forth with some 60 lbs. weight of solid silver, stowed away amongst my baggage. To guard this I had to arm my servant as well as myself, and to trust to his fidelity not to betray me. Then with regard to clothing, I had to be prepared both for great heat and intense cold. Of medicines I took a plentiful supply, for they are always useful for giving to the natives. It is well I did so, for Mr. Dalgleish's fame as a medicine man had spread throughout Turkistan, and the Turkis thought that I, being also English, must be able to cure them instantly of any illness they had.

My preparations, however, did not occupy me for very long, as my kind friends in the Legation thought of every possible necessary, comfort, or luxury, so that my only difficulty was to reduce my baggage to reasonable limits.

On April 4th, then, I left Peking, and the next day passed through the inner branch of the Great Wall. Here, under the eyes of the Emperor, it is a magnificent structure, built of immense blocks of granite. It is some 40 or 50 feet in height and wide enough at the top to drive two carriages abreast on, winding up and down the steep hill-side, over the summits and across the valley far away into the distance, and the credulous European tourist who comes out here to see it, imagines that it extends thus for hundreds and even thousands of miles; but where I passed through it next, scarcely one hundred miles from Peking, it had dwindled down to a miserable mud wall, not 20 feet in height, of no thickness, and with gaps in it often from a quarter to half a mile in width. The gateway there was very typical of a feature of the Oriental character. There were massive doors, and a lofty gateway, two guns pointing down the road, and a detachment of soldiers to collect customs duties, while twenty yards to the right was a gap in the wall wide enough for a brigade in line to pass through.

Four days after leaving Peking I reached Kalgan, on the Mongolian frontier. It is a town of some importance, as from here start the caravans to Kiakhta on the Russian frontier. Large quantities of tea

are taken by this route to Siberia, and from thence to Russia, and it has been proposed to build a camel tramway or Decauville railway across the Gobi to Urga. Mr. Sprague, of the American Mission, which is established here, gave me most valuable assistance in making preparations and collecting information. We went to all the chief merchants in the place and asked them for information regarding the route to Hami. Not one of them had ever heard of such a place. They *had* heard there was such a country as Turkistan, but they thought it would take many months to get there.

At Kalgan I met the ex-captain of a Chinese gunboat, which had been engaged in the action at Fuchau during the Franco-Chinese war. His vessel being moored at some distance from the French fleet, had escaped without much damage, while the rest of the Chinese squadron was almost totally destroyed. Hence the Chinese Government considered he had shirked his duty, and sent him into exile at Kalgan. Had he, on the other hand, blown up his vessel and perished in the wreck, he would have received the highest posthumous honours.

Leaving Kalgan on April 10th, I turned off westward, and ascended the valley of the Yangho. The country presented a desolate and deserted appearance, for the villages were half in ruins; numerous watch-towers, now falling to pieces, were scattered over the country; and the inhabitants, looking ill-fed and badly clothed, were attempting in a half-hearted way to cultivate fields which were constantly being covered with layers of dust by the horrible sand-storms, which used to occur almost daily at this time of the year. The country is of the formation called loess, a light friable soil which crumbles to dust when the slightest pressure is put on it. In consequence of this, the roads are often sunk 30 or 40 feet below the level of the surrounding country; for when a cart passes along a road the soil crumbles into dust, the wind blows the dust away, and a rut is formed. More traffic follows, more dust is blown away, and gradually the roadway sinks lower and lower below the surrounding level; for the Chinese here, as elsewhere, never think of repairing a road.

On the 12th April I passed through the Great Wall, which I have described above, entering what Marco Polo calls the Land of Gog and Magog. For the next two days I passed through a hilly country inhabited by Chinese, though it really belongs to Mongolia; but on the 14th I emerged on to the real steppes, which are the characteristic features of Mongolia Proper. Stretching far away in the distance there was a great rolling grassy plain on which the flocks and herds and the yurtas, or felt-tents, of the Mongols were scattered about. These people offered a striking contrast to the Chinese inhabiting the districts I had just left. They were strong and robust, with round ruddy faces, very simple minded, and full of hearty good humour. They are entirely pastoral and nomadic in their habits, and do not take to agricultural

pursuits. The old warlike spirit which made them so powerful in the days of Chenghis Khan has now disappeared completely. The Chinese Government has purposely encouraged the men to become Lamas, and now it is said that as much as 60 per cent. of the whole male population are Lamas, who by their religion are neither allowed to marry nor to fight. In consequence there is a great decrease in the fighting strength of the Mongols, as well as in the whole population. A recent famine carried away numbers more, and the country, it seems, would almost become depopulated, were it not that Chinese immigrants are now invading it, and these are even outdoing the Mongols in their own callings, for I met Chinese in Mongolia who owned flocks of sheep which they were fattening for the Peking market.

On April 17th, I reached Kuei-hua-cheng or Kuku-khoto, an important place of trade with Mongolia; its importance, however, has diminished since the tea from Hankow has been taken round by steamers to Tientsin, and thence by Kalgan to Kiakhta, in preference to the old land route by Kuei-hua-cheng and Urga.

I now had to prepare for my journey across the desert to Hami, and was fortunate enough to get the valuable assistance of Mr. G. W. Clarke, of the China Inland Mission, in making my arrangements. This gentleman had travelled 16,000 miles in China during his long residence in that country, and had assisted Mr. A. R. Colquhoun in his journey through South-west China, so that he well knew the requirements of a traveller.

There was considerable difficulty at first in finding a man who was willing to hire out camels to go across the desert with such a small party. A Chinese native of Guohen, however, finally agreed to do it for double the ordinary price, all of which he required in advance. Next a propitious day on which to start had to be chosen. April 26th was fixed, and in the meanwhile I had plenty to do laying in provisions for the whole sixty or seventy days which would be occupied in crossing the desert. Flour and rice, together with the tinned beef which I had brought from Peking, were to be the great stand-by, while I also, in order to make the journey as little disagreeable as possible, took a supply of potatoes, dried beans and mushrooms, raisins, apricots, and tinned milk and butter. A tent was also purchased, and the last, but not the least, articles of my equipment were two water-casks, which were filled with water daily before starting on the march, so that if, as sometimes happened, we did not find water at the end of it, we should still have a supply in reserve. The auspicious day having arrived, we started from Kuei-hua-cheng, the party consisting of my Chinese servant, who also acted as interpreter, the camel-owner, who acted as guide, a Mongol assistant, and myself. There were eight camels. I rode one myself, four others carried my baggage and stores, and my servant rode on the top of one of these baggage camels; of the remaining three, one carried

the water, one was laden with brick tea, which is used in place of money for buying things from the Mongols, and the third was loaded with the men's things.

After crossing the cultivated plain round Kuei-hua-cheng, we ascended the buttress range on to the great Mongolian plateau, which along the route I followed is generally from 4000 to 6000 feet above the sea-level, with a few depressions 2000 or 3000 feet. For some days I passed over an undulating country, with grass meadows and clear streams of pure water. But gradually the aspect of the country became more and more barren, the streams disappeared, and water could only be obtained from the rough wells or water-holes dug by former caravans. No grass could be seen, and instead the country was covered with dry and stunted plants, burnt brown by the sun by day and nipped by the frost by night. Not a sound would be heard, nor scarcely a living thing seen, as we plodded along slowly, yet steadily, over those seemingly interminable plains. Sometimes I would strike off from the road, and ascend some rising ground to take a look round. To the right and left would be ranges of bare hills, very much resembling those seen in the Gulf of Suez, with rugged summits and long even slopes of gravel running down to the plain, which extended apparently without limit in front of me. And there beneath was my small caravan, mere specks on that vast expanse of desolation, and moving so slowly that it seemed impossible that it could ever accomplish the great distance which had to be passed before Hami could be reached.

Our usual plan was to start at about three in the afternoon and travel on till midnight or sometimes later. This was done partly to avoid the heat of the day, which is very trying to the loaded camels, but chiefly to let the camels feed by daylight, as they cannot be let loose to feed at night for fear of their wandering too far and being lost. Any one can imagine the fearful monotony of those long dreary marches seated on the back of a slow and silently-moving camel. While it was light I would read and even write, but soon the sun would set before us, the stars would one by one appear, and through the long dark hours we would go silently on, often finding our way by the aid of the stars alone, and marking each as it sank below the horizon indicating how far the night was advanced. At length the guide would give the signal to halt, and the camels with an unmistakable sigh of relief would sink to the ground and their loads would quickly be taken off, and before long camp would be pitched, and we would turn in to enjoy a well-earned sleep, with the satisfaction of having accomplished one more march on that long desert journey.

But though these marches were very monotonous, yet the nights were often extremely beautiful, for the stars shone out with a magnificence I have never seen equalled even in the heights of the Himalayas. Venus was a resplendent object, and it guided us over many a mile of

that desert. The Milky Way, too, was so bright that it looked like a bright phosphorescent cloud or as a light cloud with the moon behind it. This clearness of the atmosphere was probably due to its being so remarkably dry. Everything became parched up, and so charged with electricity, that in opening out a sheep-skin coat or a blanket a loud cracking noise would be given out accompanied by a sheet of fire. The temperature used to vary very considerably. Frosts continued to the end of May, but the days were often very hot, and were frequently hottest at nine or ten in the morning, for later on a strong wind would usually spring up, blowing sometimes with extreme violence, up till sunset, when it generally subsided again. If this wind was from the north the weather was fine but cold. If it was from the south it would be warmer, but clouds would collect, rain would sometimes fall; generally, however, the rain would pass off into steam before reaching the ground. Ahead of us we would see rain falling heavily, but before it reached the ground it would gradually disappear—vanish away—and when we reached the spot over which the rain had been falling there would not be a sign of moisture on the ground.

The daily winds, of which I have just spoken, were often extremely disagreeable. It was with the greatest difficulty that we could keep our tents from being blown down, and everything used to become impregnated with the sand which found its way everywhere, and occasionally we had to give up our march because the camels could not make any head against the violence of the wind.

But in spite of many disagreeables, the desert has some charms, and I well remember the day on which I made the following entry in my diary. "A really delightful morning. The desert is not so dreary after all: for no artist could wish for a finer display of colouring than the scene presents this morning. Overhead is a spotless clear blue, and beneath it the plain has lost its dull monotonous aspect, fading away in various shades of blue, each getting deeper and deeper till the hills are reached, and these again in their rugged outline present many a pleasing variety of colours all softened down with a hazy bluish tinge; while the deceitful mirage makes up for the absence of water in the scene, and the hills are reflected again on what appear to be lovely lakes of clear still water."

After crossing the Galpin Gobi, which Prejevalsky says is the most sterile part of the whole Gobi, and in comparison with which he says the deserts of Tibet might be called fruitful, I passed along the southern part of the Hurku Hills, crossing Prejevalsky's route at the Bortson well. It was now of interest to find out whether the range extended as far westward as the Tian-shan or whether it formed a continuation of the Altai Mountains. We travelled on, then, in a north-west direction for 190 miles over a plain lying between the Hurku Hills and a similar but somewhat lower range running parallel

to it on the south at an average distance of 30 miles. A low watershed connecting these two ranges was crossed, and we then descended into a low-lying sandy tract very much similar in character to the Galpin Gobi. The Hurku range here comes to an end, its extreme length being about 220 miles. It is highest at its western extremity, where the peaks are probably about 8000 feet high. It presents a bare sterile appearance throughout, though stunted shrubs can be found in the hollows and along the watercourses.

At the western end of the Hurku Hills, between it and the range to the south, is a most remarkable range of sandhills. It is about 40 miles in length, and is composed of bare sand, without a vestige of vegetation of any sort on it, and in places it is as much as 900 feet in height, rising abruptly out of a gravel plain. With the dark outline of the southern hills as a background, this white fantastically shaped sand-range presents a very striking appearance. It must have been formed by the action of the wind, for to the westward of this range is an immense sandy tract, and it is evident that the wind has driven the sand from this up into the hollow between the Hurku Hills and the range to the south, thus forming these remarkable sandhills. Tradition corroborates this supposition, for the Mongols say that a large force had been collected, and was preparing to march to China, when a mighty wind arose, blowing the sand of the desert against them and burying them all together, with several villages and temples. At the present time a stream runs along the northern foot of the range; this stream has some patches of meadow land on its banks, on which are pitched several groups of Mongol yurtas.

To the west of the Hurku range is a very barren sandy tract forming a depression between that range and the outlying spurs of the Altai Mountains. This depression is about 80 miles in length, and to the north is bounded by a series of isolated hills which form connecting links between the Hurku range and the Altai Mountains.

Descending into this depression on the 8th June, we, towards dusk, approached a low range of broken hills, and as night fell, the guide came up to me with a terror-stricken face and said that it was a favourite resort of robbers, and told how a short time previously nine men out of one caravan had been killed, and the remainder left in a pitiable state to continue their journey on foot across this awful desert. The Mongol said, too, he had just seen a horseman riding to the hills. We had accordingly to keep a sharp look-out, and when we reached the foot of the hills, halted, and taking the loads off the camels, wrapped ourselves up in our sheepskins and watched through the long hours of the night. Day broke at last, and then we silently advanced and entered the hills. Very weird and fantastic in their rugged outline were they, and here and there a cairn of stones marked where some caravan had been attacked, and as we passed these each man threw one more stone on the heap.

Arriving at a well in a hollow we encamped for the day, and in the evening set out again, revolvers and carbine loaded and ready. As night fell we emerged on to the plain again, and with a great sigh of relief my men added a goodly number of stones to the last cairn.

We now approached the outlying spurs of the Altai Mountains, and on some of the higher peaks to the north could be seen patches of snow. These mountains are perfectly barren, the upper portion composed of bare rock and the lower of long gravel slopes formed of the debris of the rocks above. In such an extremely dry climate, exposed to the icy cold winds of winter and the fierce rays of the summer sun, and unprotected by one atom of soil, the rocks here, as also in every other part of the Gobi, crumble away to a remarkable extent, and there being no rainfall sufficient to wash away the debris, the lower features of a range gradually get covered with a mass of debris falling from the upper portions, and in the course of time a uniform slope is created, often 30 or 40 miles in length, and it is only for a few hundred feet at the top that the original jagged rocky outline is seen.

It was in this region that I first heard of the wild camel. The guide one day pointed out to me a prominent peak in the Altai Mountains, and said that behind it was a grassy hollow, which wild camels usually frequented. Later on I met a Mongol hunter who said the Mongols shoot the wild camel for the sake of its skin, and they also catch the young ones to train up for riding purposes, and I was assured that these would go for 200 miles a day for a week, but they can never be broken in to carry a load. They were described to me as being smaller than the tame species, and were said to have short smooth hair in place of the long hair of the ordinary Mongolian camel. I was once shown the track of a wild camel, and it was certainly very much smaller than that of the tame one. Prejevalsky saw these animals both at Lob-nor and in the desert of Dzungaria.

We also saw here considerable numbers of wild asses, which appeared to be perfectly similar to the Kyang of Ladak and Tibet; and wild horses too—the *Equus Prejevalskii*—roaming about these great open plains.

Before leaving the Altai Mountains I picked up several heads of the *Ovis Poli*, called Argali by the Mongols. They were somewhat different from those which I afterwards saw at Yarkand, which had been brought in from the Pamir. Those I found in the Gobi were considerably thicker at the base, there was a less degree of curve and a shorter length of horn. A full description of the *Ovis Poli*, with a large plate drawing of the horns, may be seen in Colonel Gordon's 'Roof of the World.'

I unfortunately was unable to spare any time to shoot as Hami was still a long way off, and some 2000 miles of country beyond Hami had to be traversed before India could be reached. We accordingly pushed

on, and at last one evening from the top of a hill I saw far away in the distance, and scarcely distinguishable from clouds, the snowy outline of the Tian-Shan or Celestial Mountains. My delight was unbounded, and for a long time I feasted my eyes on those "Heavenly Mountains," for they marked the end of my desert journey. The next march, however, was the most trying of all. The route descends into the desert of Dzungaria which separates the Tian-Shan and Altai mountain systems. We passed out of the low broken ranges of hills which lie at the base of the higher ridges, emerging on to a great open plain of bare gravel without a blade of vegetation. From 11 in the morning through the heat of the day till 11 at night we marched on, then halted for a short time to make some tea, and starting again at 2.30 a.m. marched on through another day till three in the afternoon. The length of that march was 70 miles, and not a sign of water could be found throughout, while the heat was intense, for the wind blew off the heated gravel as from a furnace, and I used to hold up my hand to protect my face from it in the same way as one would in front of a fire. We encamped among some trees at a height of 1700 feet above the sea. This is the lowest point I reached in the Gobi. But after our long march we got no rest, for we were pestered with swarms of sandflies and midges. Starting at 1.30 the next afternoon we now began to ascend the slopes of the Tian-Shan Mountains, and as we were travelling on through the night we were suddenly hailed by a shrill voice. The guide replied, and then led us to a house in which we found some Turki men and women. This was the first sign that we had left Mongolia and had now entered Chinese Turkistan. Running by the house was a little stream of the most delicious water, and well do I remember the delight with which I gulped down mouthful after mouthful of it, for during the whole desert journey of two months the water had always been bad and brackish, and even when made into tea, in which form I always drank it, was still very unpalatable. During the next day we still ascended the bare gravel lower slopes of the Tian-Shan, and on the following day crossed the range at a height of 8000 feet above the sea. The upper portions were covered with very fine grass, but trees were not often seen. I picked up several specimens of *Ovis Poli* horns and was told that they are very plentiful about there.

On descending the southern side of the Tian-Shan I expected to enter a fine well-populated country, but instead of that I found the same barren desert as before, with, however, a small oasis every 15 or 20 miles with a village and cultivated lands. On July 4th we at last reached Hami, having accomplished the distance of 1255 miles from Kuei-hua-cheng in 70 days.

In the whole distance very few inhabitants were met with, but every few days we would come across two or three felt tents pitched on some spot where scanty pasturage could be found for the flocks and herds of

the Mongol inhabitants. Sometimes a small stream would be met with, and along its margin would be a narrow strip of grass, but generally the only means of obtaining water was from wells. These wells were from 10 to 20 feet deep, and often less. We occasionally had to dig ourselves for water when we had missed our way or had found the usual well choked up with sand. Along the route, then, the water is evidently not far from the surface of the ground, and this is partly accounted for by the fact that the road, almost throughout, keeps along the base of hills or along the depression between two parallel ranges. The soil is generally gravel, and sandy tracts were only crossed in the low-lying districts of the Galpin Gobi and the portion of the Gobi lying between the Hurku range and the outlying spurs of the Altai Mountains. Fodder for camels can nearly always be found, though it is often very scanty, and the animals have to wander over a great extent of country picking up a mouthful here and there. Grass is rarely seen, and it is impossible to take ponies along this route unless you are able to change them every fortnight or so.

It was difficult to get any accurate information about the tribes inhabiting the country passed through, but, as far as I could learn, the country up to the Galpin Gobi is inhabited by the Tumed tribe, the region south of the Hurku Hills is occupied by the Sain Noin tribe, while the Djassaktu tribe occupied the spurs of the Altai Mountains. There is a distinct difference in personal appearance between the Mongols of Eastern and Western Mongolia, the features of the former being rounder and fuller, while the latter had rather more elongated faces with noses slightly more prominent and less squat than the Eastern Mongols. The few inhabitants I met with on the desert journey were miserably poor and wretched-looking. They were dressed in filthy rags, and evidently had to content themselves with very little food. Milk—camel's, cow's, sheep's, or mare's—is the principal article of their diet. Once a day they mix up with it some flour or millet which they buy from Chinese merchants, who come round during the summer months selling them grain, tobacco, opium, and articles of dress, at very exorbitant prices, or bartering these articles for ponies and camels.

At Hami, the great road from Peking through the provinces of Shansi, Shensi, and Kansu to Turkistan, joins that which I had been following. This place had been visited a year previously by Mr. Carey. It is of no great interest, though of importance strategically as the meeting-point of the roads from Kashgar and Kuldja. This was the first town of Turkistan I passed through, and I noticed directly a regular change from the ordinary Chinese towns. In China the houses are as a rule large and well built, with pent-roofs and overhanging eaves; the shops are of a respectable size, with plenty of room inside for the storage of goods for sale, and for several bustling shopkeepers who serve their customers from behind good solid counters. In Turkistan the houses

and shops are more after the Indian style; they are built of mud, low, and flat-roofed, and the shops small and heaped up all round with goods so that there is little room left for the shopkeeper.

At Hami I had to make fresh arrangements for my onward journey to Yarkand, a distance of about 1400 miles. The camels were discharged, and in their stead I hired an araba, or travelling cart, to carry my baggage, and bought a pony to ride myself. These arabas are large carts carried on a pair of enormous wheels, and drawn by three or four mules or ponies, which are driven almost entirely by word of mouth. There is ample room inside to lie down at full length, and on the way to Kashgar I generally preferred sleeping inside the cart on a felt laid over the top of the baggage to lying on the ground in the close, stuffy rooms of a Turki inn.

Now that I had reached Turkistan I thought that I should be able to say good-bye to desert travelling, but was again disappointed, for the whole country is really nothing but a huge desert with villages and towns situated in the oases formed by the succession of streams which flow down from the Tian-Shan Mountains. If you could get a bird's-eye view of Chinese Turkistan you would see a great bare desert surrounded on three sides by barren mountains, and at their bases you would see some vivid green spots, showing out sharp and distinct like blots of green paint dropped on to a sepia picture. In the western end round Kashgar and Yarkand the cultivation is of greater extent and more continuous than in the eastern half, where the oases are small and separated from each other by 15 or 20 miles of desert. These oases are, however, extraordinarily fertile, every scrap of land that can be cultivated is used up, and every drop of water is drained off from the stream and used for irrigation.

The inhabitants are industrious, but not such good cultivators as the Chinese. They seem peaceful and contented, dress simply and well, and live in houses which, though built of mud, are kept remarkably clean inside. The Turkis are, however, very much lacking in spirit, and are tame and submissive to a degree. They stand in the greatest awe of the Chinese, who without in the least oppressing them, and without even an army of any size to cause it, yet produce an impression in the Turki mind of their overwhelming strength and importance. The Turkis accept it all in a comfortable submissive way, and think of nothing else but how to earn a living as easily as possible. The Chinese are in fact perfect masters of the art of impressing Orientals. They live in separate towns, in which no Turkis, except in the Government employ, are allowed to reside. Their officials are scarcely known as human beings: they are presences inhabiting a great walled-in inclosure, entrance to which is barred by huge massive gates, and they never appear in public except in state and accompanied by an escort. China, too, is regarded by the Turkis as an almost fabulous country. Being separated from Turkistan by the great Gobi desert, scarcely a Turki has visited it, and the Turkis

only hear of it from the Chinese, who give the most exaggerated descriptions of it, telling them that the emperor has an untold number of soldiers at his command, and has a hill of gold and a hill of silver, from which he obtains inexhaustible wealth.

But it is not only in Turkistan that the Chinese are considered so great a nation—greater, indeed, than either England or Russia—but also to a greater extent than may be generally supposed, in such States as Kashmir and Nepal, and even by Afghan and Hindustani merchants who have travelled all through India and Russian Turkistan. Nobody there believes either that we took Peking. They know that we arrived there, but think we were driven back again by the Chinese; for if we took it, they say, why did not we keep it, or else burn it down?

I left Hami on July 8th, by the road through Pichan to Turfan. For the first three marches the road leads over a level country at the southern base of the Tian-Shan Mountains. The country is for the most part desert, but small oases are met with every ten or fifteen miles. They were covered with the ruins of the houses built by the Chinese army under General Tso-tsung-tang, which occupied this part of Turkistan for a year or more during the campaign against Yakub Beg. The soldiers are said to have quietly settled down here, cultivated the land, and grown a crop, while waiting for reinforcements with which to continue the campaign. There are still standing the remains of forts built at this time, and occasionally a monument to some Chinese officer who had fallen during the war would be seen.

Pichan is situated in an oasis of great fertility, some ten miles in length. The town itself is small, being only 400 yards square; it is surrounded by a mud wall, and has one short street of shops, but the country round is thickly studded with houses.

On July 15th I reached Turfan. The heat there was intense, as the town is situated at a very low elevation, and surrounded by the desert. The people, to avoid the heat, dig underground rooms, and live in them during the day. Here, as at all the chief cities in Turkistan, there are two towns, the Mussulman and the Chinese. The former contained some very good shops, in which the chief articles sold were Russian piece-goods and ironmongery.

Round the town for many miles on either side I noticed immense numbers of what looked like old rifle-pits, but which I found to be wells, which had been dug by the Chinese army when besieging Turfan a dozen years ago. These wells were dug at intervals of 15 or 20 yards, in the middle of the desert, and extended in several lines, each two or three miles in length. There must have been thousands of them, and the one I measured was 110 feet deep.

I stayed at Turfan a day, and then continued my journey to Kashgar, passing through the towns of Karashar, Korla, Kuchar, and Aksu, which are all very similar in character to one another.

From Aksu I sent my Chinese servant with the cart by the usual road through Maralbashi, which was first visited by Captain Biddulph, and engaged an Afghan merchant who spoke Hindustani to accompany me through Ush Turfan and the Syrt country to Kashgar.

This was the pleasantest part of the whole journey, as the Afghan and a Turki servant whom I engaged were both mounted, and we could get over the ground as fast as we liked, for I only took one baggage pony, which was very lightly laden with a roll of bedding and a few cooking utensils, and could be led along at a trot.

Starting from Aksu on August 10th, we passed through a richly cultivated country, extending almost continuously to Ush Turfan. It is watered by the Aksu river, and rice is largely grown.

Ush Turfan is a small town with one principal street. The Chinese fortress is situated at the foot of a rocky precipitous hill, about 150 feet in height, on the top of which is a small guard-post.

After leaving Ush Turfan we continued to ascend the valley of the Aksu river for three days. We were accompanied by a Kirghiz guide, as the country we were now passing through was entirely inhabited by Kirghiz. Our party was certainly a curious mixture of nationalities—an Englishman, an Afghan, a Turki, and a Kirghiz, travelling together under the protection of the Chinese.

The Kirghiz, like the Mongols, are nomadic and pastoral. They live in the same round felt tents which are here called *akoees*, which further west are called *kibitkas*, and which the Mongols call *yurtas*. They cultivate the land to a small extent, and the chief crop they grow is the poppy. They do not, however, smoke opium themselves, nor even tobacco, but finding that they can make a very handsome profit out of the poppy crops, they grow it in preference to wheat or other grains. The Kirghiz are very much more well-to-do than the Mongols or Kalmacs, who are also nomadic. They dress better, live in better tents, and keep them clean. They are fine strong men, not so industrious as the Turakis, but a great deal more so than the Mongols. In religion they are Mahommedan.

We put up every night in their tents, and they were generally very civil, though naturally rather curious to know who I was and to see all my things. The Afghan had a hard time answering all the questions, so when he found it getting monotonous, he used to spread a rug and solemnly say his prayers. He was a Hajji, and to keep up his religion properly had to pray five times a day; when he had been travelling all day and he had not been able to say his prayers, he used to make up for it in the evening by repeating them once every half-hour or so.

After ascending the valley of the Aksu river for three days over a road good enough for ponies, but impracticable for carts, we turned south-west and crossed the Kara-Kara or Belowti Pass, 11,000 feet in height. Both the ascent and descent were perfectly easy.

I was now in well-known country, for the members of Sir Douglas Forsyth's mission to Yarkand had reached as far as this, and I was able to profit by the store of information which they had so carefully collected. Captain Trotter, who rendered such valuable service to geography by joining together the Trigonometrical Surveys of India and Russia at Kashgar, had explored as far as this Belowti Pass, with Dr. Stolickza, the eminent geologist who accompanied the mission.

Descending from the Belowti Pass we passed over a stony plain surrounded on all sides by bare hills, through which we found our way to another larger plain called the Syrt. It is also surrounded by hills, but instead of being bare, it has some very considerable patches of forest and some good pasture land. There were large fields of wheat, too, grown by the Kirghiz, who had built houses to store the grain in, but continued to live in their tents themselves. They said they preferred not living in houses, as they were always afraid of their tumbling down on them. I frequently saw the Burkut or hunting eagle which is used by the Kirghiz for hawking deer and other game.

On August 19th we descended by a gorge to the great plain of Turkistan again. The Kirghiz were now left behind, and we were once more amongst the Turkis. From Kalti Ailak, where we left the hills, up to Kashgar we passed through almost continuous cultivation.

We arrived at Artish, 20 miles from Kashgar, on a market day, and the country people were bringing in the most splendid melons, apricots, grapes, and peaches. These latter were being sold at the rate of twelve for a penny. The melons were of a huge size, and very sweet and luscious, whilst the grapes were quite equal to English hothouse grapes, both in size and quality. On August 20th I reached Kashgar, and the following day called on the Russian Consul-General, M. Petrovsky, who received me most cordially, and told me all the latest European news. He has been established in Kashgar for six or seven years, and is assisted in his duties by a secretary, and has also an escort of about fifty Cossacks. He introduced me to a Belgian Missionary, M. Henriques, who had lived for many years in Mongolia, and had lately come to Kashgar in hope of converting the Turkis, but so far he has not made much progress, for in Turkistan they are very bigoted Mahommedans.

The next day M. Petrovsky returned my call at the serai where I was staying, and which I had, with the assistance of the Beg of Kashgar, made fairly respectable by borrowing tables, chairs, carpets, &c. The serais in Kashgar are not good, and I was putting up in a small room without a window, without a scrap of furniture of any sort, and with only the bare mud floor to sit on. I used to keep a large tray well piled up with fruit the whole day long, and received any one who liked to come in. The room was generally pretty crowded, and I had visits from all the Hindustani and Afghan merchants in the place. The latter

were especially friendly, and one of them said he had met "Robert Sahib" in Afghanistan during the war, and said he was the one who knew the way to fight properly. I found out afterwards that he had been engaged in three battles with the English. Curiously enough they all thought General Roberts had risen from the ranks; they said, "You have two castes in your army, the officer and the private, and General Roberts was a private."

In Kashgar and Yarkand you meet travelling merchants from all parts of Asia, and great numbers, too, of pilgrims who have been to Mecca through India. They all declaim loudly in praise of the English rule in India; not to me only, but to the surrounding crowd. They say the English are the only people who know how to really govern a country. The English make roads, railways, and canals, and build schools and hospitals, and look after the welfare of the people. Every one does what he likes and goes where he likes without restriction, and oppression is unknown. The Arabs were loudest of all in their praises, for they have evidently great respect for wealth.

I went one day to see the Hazrat Apak, where Yakub Beg was buried. I was shown a slight mound of earth and was told that that was his burial-place. The Chinese, on re-entering Kashgar, had exhumed his body, burnt it, and sent the ashes to Peking, and now they have forbidden any monument or sign of any description to be erected over the last resting-place of the man who, by his own genius, raised himself from a very humble position to be the conqueror and ruler of a vast country, and who had done much, too, for the good of the country, for on my journey I was frequently shown a road, or a canal, or a school which had been built under his rule.

In the reconquest of this western end of Turkistan there appears to have been little real fighting. On the death of Yakub Beg the opposition collapsed, and as the Chinese advanced, the Andijanians retired into their own country again, while the Turkis went on ploughing their fields, troubling themselves very little as to who should rule them for the future. The Chinese then introduced a rule remarkable for its mildness, and differing very much from their old rule before the Tungani insurrection.

My servant and cart arrived from Aksu on August 25th, and the following day I left Kashgar for Yarkand, which I reached on the 29th. Here I met with a hearty reception, for it was the home of poor Mr. Dalglish the enterprising trader, who for so many years has been established in this place, and who, after accompanying Mr. Carey in his long and hazardous journey through Turkistan and Tibet to India, has just been murdered on the Karakoram Pass when returning again to Yarkand. Englishmen who live at home at ease have perhaps little idea how jealously the honour of their country is looked after by their fellow-countrymen in the remotest parts of the world. Throughout Turkistan

I was told of the straightforward honest character of the "Chota Sahib," of his geniality, and of his ever-readiness to help the sick people, however numerous, who might come to him for medicine—and England owes much to the good name Andrew Dalgleish has established for her in Turkistan.

I had now to prepare for the passage of the Himalayas, and as all the routes to Leh had been explored by Shaw, Hayward, and the Yarkand Mission, I determined to attempt the exploration of the most direct route to India, which leads over the Mustagh Pass to Skardu and Kashmir. This route, although it is considerably shorter than any other, has not latterly been used by traders on account of the great physical difficulties which are encountered on the way, and because of the bands of Kanjuti robbers who used formerly to raid even up to the Karakoram route, and no European has ever explored it.

Baltis from the upper valleys of the Shigar district used, however, to come over to Yarkand by this route till about ten years ago, when the Chinese ordered that all who came should be turned back—since which time the route has been entirely disused. There are considerable numbers, about 2000, of these Baltis settled in the Yarkand district, where they gain a living by cultivating tobacco. I had therefore no difficulty in getting men to guide me over the mountains.

I took with me five Baltis, of whom three had been over the pass, and the other two were men whom Colonel Lockhart had, two years previously, been obliged to leave behind in Kanjut on account of sickness. The chief of Kanjut had sold these men as slaves to a Sarikoli, who sold them again to a Yarkandi who released one on payment, and the other having escaped a week or two before I arrived, joined me soon after I left Yarkand. He was a capital fellow—always grumbling, but always to the fore when hard work was to be done. Two other of my Baltis had also been captured by Kanjutis on their way to Yarkand by the Mustagh route, and they showed me afterwards the spots where the fights had occurred. They say the Kanjutis always attack at night; during the day-time they watch the travellers' movements and having marked exactly how they are encamped at night then attack under the cover of darkness. If the unwary traveller pitches a tent they cut the ropes and catch him inside it. So as I wished to end my journey in India and not Kanjut, I gave up using a tent, and for three weeks while crossing the Himalayas bivouacked out, spreading my rugs on the ground on the least windy side of any friendly rock I could find, and always changing my position after dark.

In addition to the five Baltis I had three Ladakhis, one of whom, Muhammad Esa or Drogpa, had been with Mr. Carey in his journey through Turkistan and Tibet. He was an invaluable servant, and to him I entrusted the task of organising and equipping the caravan. We had first to buy some good, sound, hardy ponies, then fit them out with

pack-saddles, blankets, and three spare sets of shoes for each, and get a set of tools for shoeing them {with. And as we should find no paths I had to take pickaxes and spades for road-making. While finally I gave to each man a long sheepskin coat and two pairs of shoes, so that there might be no fear of their breaking down on the way.

On September 8th I left Yarkand, and on the 10th branched off from the ordinary route to Kashmir by Leh, at the small town of Kargalik. The following day we reached Kugiar, and halted a day to load up the supplies which I had ordered in advance from Yarkand. I took three weeks' full supply of grain for the ponies, and flour, rice, and ghee for the men, as nothing would be obtainable along the route till the Mustagh Pass should be crossed, and, as we could not be sure that it would be possible to get over it, I had, of course, to be prepared to retrace my steps.

On September 15th I crossed the Tupa Dawán Pass, a very easy one, and only 10,400 feet high. The route then ascends the valley of the Tisnaf river. There are two or three inhabited spots here, and in the winter the few inhabitants of the Pakhpolu district bordering on the Yarkand river, come into it for the sake of the wood, which is more plentiful here than in most of the valleys of these mountains. These people are extremely interesting, for, as Dr. Bellew says, they are of a purely Aryan stock, with almost as fair a complexion as Europeans, and have remained secluded in these remote mountain fastnesses for ages. I only saw three, but Captain (now Major-General) Chapman secured two photographs of some whom the Yarkand Mission met, which may be seen in the valuable series of photographs contributed to the Report of the Mission by Captain Chapman. These people are nominally under the Chinese, but they pay blackmail every year to the Kanjutis to free themselves from liability to attack.

The Tisnaf river in September was easily fordable, but during the melting of the snows there is often considerable difficulty in crossing it. It averages from twenty to thirty yards in width, and the water is of a remarkably clear blue colour, which is particularly noticeable after seeing the muddy streams of Turkistan. As we got further into the mountains, too, I noticed that the heavy haze which perpetually hangs over the Kashgar and Yarkand districts gradually faded away. This haze must, I think, be formed of dust stirred up by the strong winds which blow almost daily in those districts, for I noticed that there was a thin permanent coating of dust on the rocks in the valley of the Tisnaf river, where there is practically no natural dust, but over which this haze continually hangs, and that as we advanced inland and the haze disappeared, so did also this coating of dust on the rocks.

At the head of the Tisnaf river we left the track which leads over the Yangi Dawan to the Karakoram Pass and Leh, and struck off west-

wards to the Chiragh Saldi Pass. The ascent to this pass was very easy, leading gradually upwards over a wide open gravel plain. This was the first unexplored pass which I crossed, and as I looked out on to the rugged mass of snowy peaks ahead, I felt that the work of exploration had really commenced, and that each one of us would have to work his hardest if we wished to successfully find our way through the labyrinth of pathless mountains ahead.

About 10 miles to the westward we could see the Tashkurgan Pass over which leads a path from the Mazar encamping ground in the valley of the Tisnaf river. I should have saved a day's march by coming by that route, but a landslip was said to have fallen blocking the road. My aneroid had unfortunately broken down, so I was unable to ascertain the height of the pass, but as there were patches of snow lying about, I compute it at between 15,000 and 16,000 feet above the sea. The descent was steep but not difficult, leading down a gravel slope to a narrow stream. We had expected to find a camping-ground on the other side of the pass, but we went on and on and still no signs of a blade of grass. On either side rose great rocky mountains, their summits capped with snow, but their sides perfectly devoid of vegetation. A nasty cold wind sprang up, snow began to fall, and darkness came on, but still we pressed on as now the stream had disappeared beneath the pebbles, and the three requisites of a traveller—water, fuel, and grass—were all wanting. At last we came upon a solitary shrub, then another and another, then some grass, and soon after some water. It did not take long then to get the packs off the ponies, light a fire, cook a meal, and turn in.

The next day we struck the Yarkand river at the camping ground of Chiragh Saldi, which is the furthest point reached by Mr. Hayward in exploring the course of that river from its source downwards.

We now descended the valley of this river for two marches to the Dora camping ground. It varies in width from a quarter to one mile, and is for the most part covered with pebbles, but there are also some fair-sized stretches of jungle and grass, in which small herds of Kyang are generally to be seen. The river itself is from twenty to thirty yards in width; it has to be crossed over twenty times, and in some places, even in the latter end of September, it is waist deep. While at one place, where it flowed between precipitous cliffs, we had to spend half a day in throwing pieces of rock and boulders into the stream to form up a narrow pathway round the cliff. The mountains bounding the valley of the Yarkand river are barren and sterile, rising to a height of probably 21,000 or 22,000 feet above sea-level. The river flows on due west for apparently about 20 or 25 miles from the Dora camping ground where we left it; ahead a great snowy range appeared to block the way, and probably from that point the river turns north towards Yarkand. As far as could be seen the valley was open, but my guides said they had

never heard of there being any path down it, and at Yarkand I was told that it was impossible to ascend the valley on account of the cliffs which run down to the water's edge. Probably the addition of the Shaksgam river, which we crossed later on, on our way to the Mustagh Pass, and which is nearly equal in size to the Yarkand river, makes the latter table, and consequently it is then impossible to get round the steep, jagged spurs running down to the river. On leaving the Yarkand we ascended the Surukwat stream to the Aghil Dawan. This stream bursts through a rocky ridge which separates it from the Yarkand river, and flows through a narrow gorge two or three hundred yards in length and only ten or twelve yards broad. The sides of this gorge are of smooth rock and absolutely perpendicular, and between them the river flows with a rapid current. Through this we were obliged to drag our ponies, and a difficult business it was for them, as the rocks were slippery with ice, and the current swift and strong. We emerged from the gorge on to a plain which was formerly the bed of a lake, which must have been formed here till the river forced its way through the gorge. During the same day's march we passed through two more gorges, and towards evening halted on the edge of a gravel plain, at the foot of the Aghil Dawan range, which rose like a wall straight in front of us, rugged and uncompromising. We had that night our first taste of real cold, and the small stream near which we bivouacked was frozen solid in the morning.

The guides now had a discussion as to which was the right point at which to attack the range. One said we ought to go to the right, and another to the left. Fortunately we took the latter course, and after winding about among the lower spurs of the range for some time, suddenly turned a corner and saw in front a great gap in the range which the guides said was the pass. The ascent was very easy, leading gradually over a gravel slope. The summit of the pass seemed quite close, but we went on and on, and never seemed to get any nearer.

In my eagerness to get a glimpse of the view on the other side I walked on ahead at a brisk pace, and ascended a small outstanding hill, from which I got the first sight of the great Mustagh range, which forms the watershed between the rivers which flow into the Indian Ocean and those which take their way towards Central Asia. At my feet lay the broad valley of the Shaksgam river, bounded on each side by ranges of magnificent snowy mountains rising abruptly from either bank, while up this valley, far away in the distance, could be seen an immense glacier flowing down from the great main range of the Mustagh or Karakoram Mountains.

The appearance of these mountains is extremely bold and rugged as they rise in a succession of needle peaks like hundreds of Matterhorns collected together, but the Matterhorn, Mont Blanc, and all the Swiss mountains would have been several hundred feet below me, while

these mountains rose up in solemn grandeur thousands of feet above me. Not a living thing was seen and not a sound was heard; all was snow and ice and rocky precipices; while these mountains are far too grand to support anything so insignificant as trees or vegetation of any sort. They stand bold and solitary in their glory, and only permit man to come amongst them for a few months in the year, that he may admire their magnificence and go tell it to his comrades in the world beneath.

As I looked on the scene I felt as if I were intruding on the abode of some great invisible but all-pervading deity, and experienced a keen sense of my own insignificance, such as those only can appreciate who have been alone in these awe-inspiring mountain solitudes of the Himalayas, surrounded by the great snowy heights, which remain there in their grandeur immovable and unchangeable through eternity; and yet man has triumphed over these mountains; he has insinuated his way through the chinks in their seemingly impregnable armour of rock and ice, and mapped, measured, and pictured them till the minutest details of their shape and size are known.

The height of the Aghil Dawan I estimate at from 16,000 to 17,000 feet. Snow was lying near the summit on which there was also a small lake about three-quarters of a mile in circumference. The descent was rather steep, leading down towards the Shaksgam river. After one hour and a half, the valley opens out, and we passed over a gravel slope which terminated abruptly in a cliff 200 feet high overhanging the Shaksgam river. We looked about in both directions to find a way down, but could see none till I noticed some tracks of Kyang, and knowing that they must get down to the river, somehow, in order to drink, I followed them up, and found they led down a very steep and narrow watercourse. We brought up the ponies, unloaded them, threw the packs down first, and then brought down the ponies, one man leading each on in front and two more hanging on to his tail behind. All came down without any accident, and we then followed down the broad pebbly valley of the Shaksgam river. This river, previously unknown to geographers, must be nearly equal in volume to the Yarkand river of which it is a tributary, but instead of being compressed into one stream like the latter, it spreads itself in many channels over a pebbly bed more than a mile in width. It flows down from the main Karakoram range in a direction rather west of north to the point where we struck it, where it turns off in a westerly direction. We followed it down the next day for fourteen miles to the point where it is joined by the Sarpo Laggo stream, it then flows off in a north-west direction to join the Yarkand river. The Sarpo Laggo flows down from the glaciers of the Mustagh Pass through a valley from a half to one mile in width. After ascending it for a few miles, we came in full view of the great peak, K 2, the second highest mountain in the world, 28,250 feet in height. We could see it through a break in the mountains rising up

straight, bold, and solitary, covered from foot to summit with perpetual snow. The upper part, for perhaps 5000 feet, was a perfect cone, and seems to be composed almost entirely of ice and snow, the accumulation of ages. The lower part was more precipitous, but steep enough to throw off the snow altogether, while at the base was a great glacier formed by the masses of snow which fell from its sides. It was a magnificent sight, and I could scarcely tear myself away from it. But we had some way still to go, as we had to push on beyond the Suget Jangal camping ground for fear of meeting Kanjutia, for the path from the Shimshal Pass, which leads to Kanjut, joins in there. Suget Jangal is the last spot where fuel can be got, so we collected a pony-load, and pressed on till we neared the foot of the great Mustagh glacier, where we bivouacked for the night.

Early next morning we started off to tackle the glacier, and here our real difficulties began, for after passing along for half a mile between the glacier and the mountain side, we found the way blocked by the ice, and we could neither get our ponies round the obstacle by climbing the mountain side, nor by taking them on to the glacier. So they were sent back to the end of the glacier, to wait till I had explored ahead with the guides. We plunged into the middle of the glacier, clambering about, often on all fours, amongst a jumbled mass of moraine and ice, passing cliffs of clear transparent ice and caverns composed entirely of ice, with icicles 20 and 30 feet long hanging from the roof. It was a most curious and beautiful sight. We ascended the glacier for a couple of miles and then saw it stretching ahead for many miles more. The guides thought it would be impossible to drag a caravan of ponies up it, and I decided on sending them back by the Karakoram Pass to Leh and going on over the Mustagh Pass with three men, as I had also to take into consideration that our supplies would be running short. But on returning to the caravan, I found that one of the men, who had been exploring the opposite side of the glacier, had found a way, and was gallantly leading the ponies over it though they were knocking and tumbling about in a fearful way. Their legs were getting cut to pieces, and the loads were falling off every five minutes. It was cruel work for them, for they had no chance of keeping their footing on the slippery ice which was usually only covered over with a thin coating of gravel. However, as a start had been made, I determined on making a renewed effort to bring them up the glacier. But they very soon got exhausted, so we halted for the day, and I then went off again with the guides to explore a route for the next day. We kept on up the east edge of the glacier, marking with small cairns the route which was best for the ponies to follow and returned to our bivouac after dark, thoroughly exhausted, for it is terribly hard work walking over those glaciers, and the rarity of the atmosphere at those great elevations adds to one's distress.

At daybreak the following morning we started again, leading the

ponies up the route we had marked out; but a mile from the point where our previous exploration had ended, we were confronted by another great glacier rolling down from the left. The guides set off to explore it while I remained with the ponies, as my boots were worn out, and my feet so bruised I could scarcely bear to put them to the ground. The men returned after a time with a look of despair and said they could find no possible way for the ponies to get over the glacier, but they said: "You have a try, Sahib, perhaps by your *ikbal* (good fortune) we may find a way." "All right," I said, and we started off back again for some distance, and then struck off right into the centre of the glacier, and ascended a prominent spot in it, from which we could get a good view all round. We were in the middle of a great sea of ice, for the glacier was four or five miles broad, and composed of pure white ice broken up into a mass of needle points, and great glaciers came rolling down the mountain sides like clotted cream pouring out of a cream-jug. From the point on which we were standing I could see a thin line of moraine extending right up the main glacier. We got on to this and followed it up for a long way, and to our great relief, found it would be quite possible to bring the ponies up it, and get them on to the smooth snow in which the head of the glacier is buried. On our return journey we nearly lost our way, and were wandering for some time in the dark before we managed to find it. We held a consultation of war that night as to which pass we should attack, for there are two leading out of the valley we were ascending. The old Mustagh Pass to the east had been out of use for thirty or forty years, on account of the accumulation of ice upon it, in consequence of which a new pass had been sought for, and another one to the west had been found. This latter pass had been in partial use up to ten years ago. No European had, however, crossed either of them, but Colonel Godwin-Austen in 1862 came very near the summit of the new pass from the southern side, when he was obliged to turn back on account of bad weather. One of my guides had at one time taken ponies across it. I decided, therefore, to send on a couple of men to reconnoitre the new pass the next day, while the remainder of us brought on the ponies up the glacier.

Early in the morning the reconnoitrers set out, while we followed as soon as we had loaded the ponies. Our difficulties were not so great this day, and in the evening we halted on the glacier. Towards dusk the two men returned from the new pass and said it would be quite impossible to get ponies down it, and that it would even be difficult for men, as masses of ice had formed. They said the best thing to be done now was to leave the ponies where they were, under the charge of three men, and set off with the rest over the old Mustagh Pass to Askoli, the first village on the other side, send back supplies from there for the ponies and men left behind, and collect a number of coolies to try and make a passage for the ponies over the new pass. Things were getting critical

now, for supplies were running short, and where we then were no fuel could be obtained, and the ponies could only feed on some few scraggy weeds which we could see across the glacier on the mountain side. So, if on the morrow the pass should prove impassable, our fate would have been a hard one, as provisions would scarcely last out till we could get back to an inhabited spot again.

It was an anxious night that, and it was also a very cold one, for we were sleeping out in the middle of the glacier with a horribly cold wind blowing down it, and we only had just sufficient fuel for cooking purposes, and could not afford to keep a fire going for a moment after our evening meal was cooked.

Next morning, while it was yet dark, we started for the pass, leaving everything behind, except a roll of bedding for myself, a sheepskin coat for each man, a few dry provisions, and a large tea-kettle. The ascent to the pass was quite gentle, but led over deep snow in which we sank knee-deep at every step. We were now about 19,000 feet above the sea-level, and quickly became exhausted. In fact, as we got near the summit, we could only advance a dozen or twenty steps at a time, and we would then lean over on our alpenstocks, and gasp and pant away as if we had been running up a steep hill at a great pace. It was most tantalising, for the top looked so near, and the slope was so easy, that it seemed as if we could run up in no time. But it was not till midday that we reached the summit, and then on looking about for a way down we could see none. Huge blocks of ice had fallen from the mountains which overhang the pass, and had blocked up the path by which travellers used formerly to descend from it, and the only possible way now of getting to the bottom was by crossing an icy slope to a cliff, which was too steep for a particle of snow to lodge on it, even in that region of ice and snow. From this we should have to descend on to some more icy slopes which could be seen below.

Nobody spoke as we looked down that pass, and I waited anxiously for the next move,—I could not give an order to go ahead, for I felt incapable of going first myself. I heard them asking each other who should go first, and at last Wali—the finest fellow that ever stepped—quietly took an axe, tied a rope round his waist, and giving the end of it to us, told us to follow him.

We had first to cross the icy slope; it was of smooth ice and very steep, and about thirty yards below us it ended abruptly, and we could see nothing over the edge for many hundreds of feet. As Wali hewed the steps we advanced step by step after him, leaning back against the slope, all the time facing the precipice and knowing that if we slipped (and the ice was very slippery, for the sun was just powerful enough to melt the surface of it), we should roll down the icy slope and over the precipice into Eternity. Half-way across, my Tartar servant Drogpa, who had been born and bred in the heart of the Himalayas, gave up,

saying he was trembling all over and could not face the precipice, so I sent him back to the ponies, which he afterwards brought round by the Karakoram Pass.

After a time we reached *terra firma* in the shape of a projecting piece of rock, and from here began the descent of the cliff. We had to let ourselves down from any little ledge, taking every step with the greatest possible care, as the rock was not always sound; and once a shout came from above, and a huge rock, which had been dislodged, came crashing past me and as nearly as possible hit two of the men who had already got some way down.

At the bottom of the cliff we came to another steep ice-slope. We tied together every scrap of rope we had, and every turban and waist-band, and then let Wali down by this on to a small piece of bare rock which showed through the ice. As he went down he cut steps in the ice. He then seated himself firmly on the rock while we tied the other end of the rope on to a rock above.

Then each man let himself down hanging on to the rope. One man in doing so slipped, fell over on his back and slid down at a frightful pace, still however clinging to the rope with one hand which was fearfully cut by the friction.

Then came the last man, he was the slave I had released at Yarkand, and how he got down has been a puzzle to me then and ever since. He tied the end of the rope round his waist, and then with the aid of an alpenstock, which he used in a most dexterous way, and the steps which had been hewn for him, he came gradually down, and as he advanced, we pulled in the slack of the rope at the bottom end, so that if he fell we could pull him up sharp. In this way we got down two more stages of the ice-slope. Then came a piece where there was no suitable halting-place within the length of the rope. Luckily, however, it was less steep, and we were able to get down it by hewing steps. And at last, just as the sun set we reached the bottom, after having faced the precipice for six consecutive hours. As I looked back at the pass it seemed utterly impossible that any man could have got down such a place.

Our troubles were not yet over, though, for we were now on a snow-field at the head of a glacier, and all round us were great mountains covered with snow and ice, so we had to trudge on over the snow and glacier till after eleven at night. We frequently met with crevasses, down which one of the men fell, and as he was the last was not missed for some little time, but we went back and extricated him in safety. Ordinarily we should have thought twice before going so recklessly over this glacier, but we were now so utterly tired, and so overjoyed too at having got over the difficulties of the pass, that we pushed along in a sleepy careless way, perfectly unmindful of the dangers of the road, till at last we came upon a dry spot where there

were a few weeds. We collected these, lit a fire with the aid of them and a couple of alpenstocks, cooked some tea, and then rolled ourselves up in our wraps behind a rock and slept as only those can sleep who have done eighteen hours' continuous work of such a description as we had had to do that day. At daybreak next morning we were on our legs again, and after a few hours' travelling emerged on to the great Baltoro glacier, which was explored by Colonel Godwin-Austen in 1862 when making the Kashmir survey and described by him in a paper read before this Society. We travelled all that day, and for two days more till we reached Askoli, a little village, situated on the Braldo river, where it was most refreshing seeing the trees and cultivated lands which surrounded it. I immediately set to work to collect supplies and coolies, and when this was done, sent off one party with supplies for the men and ponies I had left behind on the other side of the pass, and then started myself with another party of coolies to try and force my way back by the new Mustagh Pass.

I ascended the Punmah Glacier, but was brought to a standstill opposite the camping-ground of Skinmang, three days' march from Askoli, by a glacier which had rolled down from the pass. We had managed in some fashion or other to get over a good many glaciers in the passage of these mountains, but this one was the most unnegotiable of them all, for in the last four or five years the mass of ice had greatly accumulated. There were great blocks of ice as big as houses tumbled about, one on the top of the other, in such utter confusion that we could not get a footing on it at all. We were obliged therefore to turn back to Askoli. I had given orders for the party with the ponies that if I did not reach them by a certain date, after they had received the supplies they should make their way to Leh by the Karakoram, under the charge of the Ladakhi servant, Drogha, who had gone back to camp from the old Mustagh Pass. So when the coolies who had taken the supplies returned to Askoli, and brought me news of the safety of the party with the ponies, I started off for Skardo and then through Kashmir to Rawalpindi, which I reached on November 4th, just seven months after leaving Peking. Drogha with the ponies arrived seven weeks later, having come round by the Karakoram Pass route, where they had been attacked by robbers, and where also three ponies died from fatigue and exposure. Poor Liu-san, the Chinaman, too, arrived completely knocked up by the hardships he had had to go through.

Before closing this description of my journey I may say a few words on some points of other than geographical interest which I noticed when carrying it out. To begin with trade—as a commercial nation we are naturally looking for new openings for our trade, but we always seem to want such tremendously big openings, we want to construct great railways everywhere and “open up the country,” as it is called. I need not add anything here to what has already been said about railways.

But what I want to bring to your notice is the way we have neglected the *small* openings for our trades. We are enterprising enough in a big way, but we are not half enterprising enough in a small way. This is what particularly struck me on my journey. We ought to have small merchants, or travelling agents of the larger merchants, or best of all, agents of the manufacturers themselves, pushing their way right into the interior, looking after the sale of their goods themselves, seeing that they are not subjected to any unlawful imposts, as European goods are now, in their transit to the interior; examining the wants and tastes of their customers, and finding out also what articles of native produce would be worth exporting. At present our goods are allowed to take their chance after leaving the Treaty Ports, and our manufacturers seemed to have taken little or no trouble to adapt their manufactures to the tastes and requirements of the people for whom they are making the goods. The Russians have acted on better principles and have reaped their reward, for their Consul at Kashgar told me with pride what I had already observed for myself, that all the bazaars in Turkistan were filled with Russian cotton goods, and English goods could scarcely be bought now. The chief reason for this is, I am convinced, that the Russian goods are very much better suited to the people; they are stronger, more durable, and also printed with more tasteful patterns than our own, while they have their small merchants travelling everywhere, and setting up shops themselves in the bazaars.

We may be handicapped in our competition with the Russians for the trade of Turkistan by having to bring our goods across the Himalayas, but I am sure that if our goods were like the Russian, and the Russian like ours, we should be in a very much better position than we are now. And it is a fact worthy of particular notice that Russian piece-goods are being brought over the Himalayas, in gradually increasing quantities, into the bazaars of Ladak, and even, I hear, into Kashmir.

What the Russians have done already in Chinese Turkistan, let us at least try to do in other parts of the Chinese Empire. Let our manufacturers find out exactly, by practical trial, what is required, and let agents be sent into the interior to see to the sale of these goods themselves, and then, I doubt not, our goods will find their way through and through the interior of China, as Russian goods have in Turkistan.

I have already said something regarding the military position of the Chinese in Manchuria, showing what energy was being displayed there in military preparations, but in Turkistan the case is very different. The country is almost denuded of troops, and those that are there can scarcely be termed anything but police. They are quite sufficient to keep the country in order, for the Turkis are as quiet and submissive people as any in the world; but would be altogether incapable of resisting an invasion. That they should be so weak in this western end of the empire may be a serious matter for the Chinese, because the great distance which

reinforcements would have to traverse, and the barren nature of a great part of the country through which they would have to pass, makes it impossible to reinforce their army, say at Kashgar and Yarkand, except after a lapse of many months. People are asking now what chance the Chinese would have in a real struggle with a European Power. One hears constantly of their purchasing large numbers of Krupp guns, breech-loading rifles of all sorts, gunboats, and even large heavily armed ironclads; of their building arsenals and forts; and of their employing European officers to instruct and drill their troops; and one might be led to suppose, as the Chinese themselves do, that they have become a powerful military nation.

But this is not the case, as unfortunately for them these inventions of modern warfare do not, as the Chinese half suppose, act as a patent charm or talisman, making the country proof against invasion, and they are rendered almost valueless from the corruption and want of discipline which prevail; while as long as the military profession is held in such contempt as it now is in China, it will be impossible to get good officers into the army. The material to hand for recruiting the rank and file is, however, excellent, and by offering good pay the Government could secure an almost unlimited number of men; and who knows what these might not be capable of doing under such a leader as the late General Gordon?

My journey across the Chinese Empire was now finished, and I had travelled for some 7000 miles over almost every description of country which could be imagined—through the gloomy forests and dismal swamps of the Long White Mountains and over the open steppes of Mongolia, through the richly cultivated plains and valleys of Manchuria and the great desert wastes of the Gobi, and finally over the rugged glaciers and lofty passes of the mighty Himalayas. The climate varied as greatly as the scenery—from the scorching heat of the desert to the icy cold of the Manchurian winter and the Himalayan heights.

Throughout I was shown more consideration than I had ever expected by the people with whom I was brought into contact, who, besides Chinese, included Manchus and Koreans, Mongols and Kalmaks, Turks and Kirghiz, Afghans and Hindustanis, Kashmiris and Baltis. That I was enabled to carry out this journey successfully is entirely due, under Providence, to the unfailing fidelity shown towards me by my staunch companions, Liu-san the Chinaman, Droopa the Tartar, and Wali the guide; and also to the good fortune by which I was enabled to get a practical experience of travel, in the first and most important part of the journey, under so good a leader and so kind a friend as Mr. James, to whom I owe a debt of the deepest gratitude.

After the paper,

Sir HENRY RAWLINSON congratulated himself on being able to attend the meeting that evening, and listen to so interesting a paper. Considering the interest he had

taken in the subject, it had been to him a great enjoyment. So long ago as 1837 he first imbibed an interest in the Kirghis Steppes, and in the geography of Central Asia. During the fifty years that had elapsed since then he had taken every opportunity of maturing the knowledge which he received from his early studies. At the present day (and it would still more apply to the future) the difficulties of the early travellers could hardly be appreciated. There was now a railway to Samarkand, the opening of which a few days ago he was invited to attend. When he began to study geography Samarkand was almost a fabulous place. It was known that there was such a town, but as for any one visiting it, except a solitary traveller like Vambéry, such a thing was never heard of; but now a person could book himself for Samarkand just as for Constantinople. But although the journey was so easy now it was not in former times, and he trusted that the present facilities would not detract from the merits of the early explorers, especially those who visited such far-off countries as Mongolia and Eastern Turkistan. In future times those countries might be included in the Grand Tour, but the names of Carey and Younghusband would always be retained in the first rank of explorers who had found their way across the great plateau of Central Asia, from China to India. Lieutenant Younghusband had given a most admirable account both of his journey through Mongolia and of his wonderful exploit of crossing the range and the glacier pass.

Lieut.-Colonel GODWIN-AUSTEN said that in the summers of 1860 and 1861 it was his good fortune, when serving under Captain Montgomerie, to be deputed to visit and survey the region of the Mustagh glaciers—in 1860 the mountains north of the Shyok river, in 1861 from the great glacier which descends from K₅, and thence along the main range westward close up to Hunza Nagayr. The position of K₅ had been fixed from trigonometrical stations on lofty peaks far to the southward by Captain Montgomerie's assistants. It was hardly possible to describe the grandeur of those glaciers, and he could realise the difficulties Lieut. Younghusband had had to contend with in crossing the pass. Great changes had evidently taken place since he was there. The pass lately crossed by Lieut. Younghusband was completely closed, and no one had been over it for many years, but the pass over the Mustagh Pass was then at the head of the Punmah glacier further north and west. He had tried to reach it, but was driven back by snow coming on when very close to it. Lieut. Younghusband had attempted to go over that way, but could not get beyond Skeenmung. In all probability the greater accumulation of snow on the higher parts had piled the gorge just beyond Skeenmung with ice. When he was there all the glaciers were advancing. The great glacier at Arundo had advanced to within 400 yards of the village since Mr. Vigne was there, when he records that it was 1½ miles distant; and some of the people said that in their young days it was a mile off up the valley. That showed the great rate at which the glaciers were advancing. It would be an interesting thing if an expedition were made to them again in order to note the changes that have taken place in twenty-seven years, and clear up many points connected with glacial action and motion. He congratulated Lieut. Younghusband on the magnificent journey he had accomplished.

Mr. C. F. R. ALLEN said he had been twenty-five years in China, and had the great pleasure of meeting Mr. Younghusband at the commencement of his journey. He knew nothing of Mongolia, except that he had been the first stage on to the great Central Asian plain. He could bear testimony that what Mr. Younghusband called a disagreeable wind was a very severe, cutting wind. He could add his evidence as to the filthy habits of the Mongols, and the rags in which they were constantly clothed.

General J. T. WALKER drew attention to the circumstance that the Mustagh Pass, which Lieutenant Younghusband had crossed with such difficulty, is situated within a few miles of the second highest mountain yet discovered. This mountain, in conformity with their custom of naming the peaks of distant ranges in succession by numerals and letters of the alphabet, provisionally, until the local names can be ascertained, is still only known by the designation K₂, which was given to it by the officers of the Trigonometrical Survey. Thus the mountain in the Eastern Himalayas, which is the highest yet measured, was primarily designated XV. by the surveyors. Sir Andrew Waugh, who was then Surveyor-General of India, having long tried unsuccessfully to find out its proper name, at last told the Asiatic Society of Bengal that he had always scrupulously adhered to the rule of ascribing to every geographical object its true native appellation, but here was the highest mountain in the world without a local name, and hence the duty devolved upon him to assign a name whereby it might be known among geographers, and become a household word among civilised nations. He therefore proposed to call it "Mont Everest," after his respected chief and predecessor, using the French "mont" instead of the English "mount," to indicate that the object named was the peak only, and not the entire mountain range. Before Sir Andrew Waugh left India the second highest peak was discovered, but he did not confer a name upon it. He tried to discover a name, but did not succeed, and the last Englishman who has seen it, Lieutenant Younghusband, does not appear to have heard of any name for it. It might seem very strange that so lofty a peak should not have a definite name, but the explanation was that it was surrounded by a number of satellite peaks, very nearly as lofty, which stood between it and the nearest inhabited regions, cutting it off from view. In the same way Mont Everest had four satellite peaks around it, which shut out the pinnacle itself from general view; the consequence was that the satellites were named, while the pinnacle remained unnamed. There could be no question about the advisability of assigning a name to so lofty and eminent a peak as K₂, and he would propose that in future it should be known as Peak Godwin-Austen, after the officer who first surveyed the Mustagh range and glaciers. He had drawn the wall maps illustrative of the relative magnitudes of those glaciers and the Chamouni glacier which were exhibited to the meeting. General Walker added that it had been a very great gratification to him to hear the paper by Lieutenant Younghusband, whose father was an old friend of his own. He was very glad to think that the son had done his best in regions outside India to rival his father's exploits inside India.

Sir HENRY RAWLINSON said he should be very glad to act as second sponsor at the baptism of Mount Godwin-Austen.

Colonel WOODTHORPE said he wished to offer a few remarks on a statement made by Lieutenant Younghusband, which, though perfectly true and innocent in itself, seemed in these days, when the worst of motives are often imputed to the best of men, to require a little explanation. It was quite true that Colonel Lockhart left two men at Kanjut, but it caused him a great deal of sorrow to do so. It would be doing a great wrong to him to entertain the idea that he did so unnecessarily, for he was one of the most tender-hearted as well as bravest and most generous of men. One of those left behind fell sick shortly after they left Hunza. As they approached the Kilik Pass he became worse and worse with pneumonia, and Dr. Giles, just as they reached the foot of the pass, said to Colonel Lockhart, "To save this man's life it is absolutely necessary that he should remain behind." Colonel Lockhart replied, "I do not like leaving him among these Kanjuti who are known to be such utter scoundrels: I should be much more pleased to take him on at whatever inconvenience to ourselves." Dr. Giles then said, "He cannot possibly stand the journey over the snow." The fact turned out to be that it was very hard work for the

strongest to get over, and two men succumbed on the pass who were perfectly well previously. Much against his will, Colonel Lockhart decided to leave the man behind with the young Rajah of Kanjut. He could not be left by himself, and another Balti coolie volunteered to remain with him. In order to ensure their safe return, Colonel Lockhart gave the young prince a written order for 200 rupees to be paid to him on their safe delivery at Gilghit. The coolie certainly would have died on the pass, and it was fortunate for him that he fell in with Lieutenant Younghusband, who was able to rescue him from slavery, giving 62 rupees for him. By taking him down a few short marches to Gilghit, the Rajah would have received 100 rupees each for the two men. General Lockhart was not present, but he (Colonel Woodthorpe) could say that he rejoiced greatly that Lieutenant Younghusband had been able to release these men, so unavoidably left in Hunza. He would add that no one appreciated Lieutenant Younghusband's great achievement more highly than he.

Mr. H. H. HOWORTH, M.P., said it was most gratifying to hear the very kindly references that had been made to poor Dalgleish. It was pleasant to find an Englishman in those regions emulating the reputation of Connolly and others who had died in those terrible wilds, and left an impression which would make it easier for Englishmen to follow in their steps. It was also gratifying to know that the name of England had reached those regions as that of an empire which was doing a great deal of benevolent work in civilising and improving the condition of the people. There were two features in the paper which were exceedingly interesting. One was the remarkable light this journey was likely to throw on some problems of physical geography immediately to the north of the great range, and also on the ethnography of the district. Until a few years ago it was always understood that the snows which fell to the north were so dry, like those around Chimborazo, that they were never converted into ice, or formed glaciers. In regard to the history of this region, one of the most pitiful chapters in all human annals was the Chinese desolation of the great string of Turkistan towns, when they put down the power of Yakub Beg. Up to that time it was a great and important trade route, along which passed almost all the commerce of Central Asia from Mediæval and even Roman times. If any one would turn to an interesting book which could be seen in a manuscript translation in the British Museum, containing the account of the campaigns and journeys made by a cousin of the great Baber, the founder of the Mogul Empire, and contrast the extreme prosperity of the towns in that district with regard to trade, and the power of the petty chiefs in the sixteenth century, with the desolation which followed the Chinese occupation, he would learn a very great lesson. He wished to know if Lieutenant Younghusband passed the ruins of towns that were outside the small posts which now formed the centres of civilisation, and also whether at Hami he saw the tombs which were described by a Jesuit as forming an interesting feature in the landscape. Hami, planted just at the end of the long range, really formed the great gathering-ground where the Turkis and Mongols had been in close contact ever since the beginning of Eastern history, and it was the one spot where many riddles might be expected to be solved. It would be interesting to know where the coins were obtained that Lieutenant Younghusband had brought home. A very remarkable series of coins with Tibetan inscriptions upon them had been found in the mounds close to Hami, and it was important to try and bring together the débris that travellers brought back. The great feature of modern history was the sweeping away of all the small tribes that occupied such areas, and the substitution of great homogeneous races. The only remains left of the former inhabitants were the archaeological fragments that travellers now had an opportunity of collecting.

Instead of being remitted to country houses, where within a few years they were placed in the garret, or formed the playthings of children, they should be sent to the British Museum. Had Lieutenant Younghusband brought home any archaeological remains from the North Desert?

Lieutenant YOUNGHUSBAND, in reply, said that the coins he had brought back were mostly collected at Yarkand. He let it be known that he would give two annas, about equal to threepence, for every old coin brought to him. He had not yet shown them to the British Museum, but he hoped to do so before long. The only relics he brought home were jade bowls. He saw the tombs at Hami. There were three cities there, the Chinese, the Turk, and the New Chinese. The tombs were immediately outside the Turki city. They were covered with very fine green tiles, and stood up remarkably prominent amongst the houses of which Hami was built. He saw no ruined towns in his journey through Turkistan. There were a few ruins in the eastern part of Chinese Turkistan, but they were ruins of barracks which were formed during the campaign of 1875 and 1876. He saw no ruins older than that. Probably the old towns had now been built over, and if there were formerly any out in the desert, they had been buried beneath the sand which accumulated in immense quantities.

The PRESIDENT expressed his assent to all that had been said as to the great interest and value of Lieutenant Younghusband's account of his adventurous journey, under circumstances of extreme difficulty, from the extreme east of Asia to India. He had condensed in the paper the experiences of seven months, and it was not to be supposed that he had mentioned all the details of everything he had seen. The seven months to which he had referred had been extended by Colonel Godwin-Austen to twenty-seven years, and by Sir Henry Rawlinson to fifty years. He was not going to attempt a review of what had happened during the past half-century, but he would remind the meeting that the knowledge of these regions which had been acquired during this period had been necessarily at the cost of great endurance, and even the lives of energetic, courageous men. The first European who lost his life in attempting to explore those countries was Adolph Schlagintweit. The names of Stolicska and Basevi should also be added as having fallen in the same cause; and the last sacrifice was Dalgleish, whose services had lately been prominently brought to notice in connection with the extremely adventurous journey of Mr. Carey. These were the unavoidable conditions under which knowledge was advanced, and fortunately men were still to be found who were ready to undergo the troubles, and fatigues, and dangers of such explorations. The Mustagh Pass appeared to be the centre of the most wonderful accumulation of glaciers on the face of the earth. Some of them, which Colonel Godwin-Austen described, and which Lieutenant Younghusband must have passed over, were from 30 to 40 miles in length, and probably by passing from one to another, the traveller would be able to go over a glacier surface of 70 or 80 miles. The dangers and difficulties of such journeys as Lieutenant Younghusband's, could be more readily imagined than described, and he trusted that explorers would still be found to carry on such explorations.

Unexplored Basuto Land.

By Lieut.-Colonel Sir MARSHALL CLARKE, K.C.M.G., H.M. Commissioner
for Basuto Land.

(Read at the Evening Meeting, April 23rd, 1888.)

Map, p. 548.

BRITISH BASUTO LAND is bounded by the Orange Free State, the Cape Colony, and Natal. It comprises the watershed of the Caledon river and the basin of the head waters of the Orange river. The Caledon for the first 130 miles of its course divides Basuto Land from the Orange Free State, and the country between it and the Drakensberg, or Maluti as the Basuto call their mountains, has been known to Europeans for the last fifty years.

Here, under the protection of Moshesh, the consolidator of the tribe, the French Protestant missionaries began the work they have since so earnestly and perseveringly carried on; and here was the field of many a fight between Boers and blacks from the time of the abandonment of the Orange River Sovereignty, the consequent establishment of the Orange Free State, and the annexation of what could be reasonably saved to the Basuto by Sir Philip Wodehouse, acting on the part of Her Majesty's Government in 1868.

Since the annexation the country has been divided into magistracies, intersected by roads, and is now thickly populated, and for the most part under cultivation.

The larger section of Basuto Land, comprising the basin of the head waters of the Orange river, has hitherto been but little explored. The Drakensberg range appears to have formerly been a sandstone plateau, 8000 to 10,000 feet in height, the upper stratum of coarse friable rock sloping to the south and west, but falling away in perpendicular cliffs to the eastward. Now it is everywhere intersected by streams which have cut courses for themselves, in some places two and three thousand feet below the normal level of the mountains. The ridges between the river valleys are during a great part of the winter covered with snow and impassable. At any time of the year the best routes are obtained by following the watercourses: this is attended with some risk when the rivers are in flood, as in the narrow valleys it entails crossing continually from side to side to avoid the necessity of making considerable detours.

Until recently the mountains were uninhabited. The Bushmen, whom the Basuto on their arrival from the northward found in possession, were gradually driven to the most difficult country, till in 1871 the last remnant were, in retaliation for repeated cattle thefts, destroyed by Jonathan and Joel Molapo, grandsons of Moshesh, who lived then as now in Northern Basutoland.

During the late rebellion of the Basuto against the Cape Colony a number of the Batlokoa tribe, long settled in Griqualand East, took up arms against the Government, and, on the re-establishment of peace, found themselves exiles from their homes and dependent for their existence on the Basuto, for whose cause they had lost all they possessed. After some years, seeing they were still scattered and recipients of a grudging charity, Ledingwana, their chief, obtained permission from the paramount chief Letsie to collect and take his people into the mountains where they could support themselves on game. He settled at the junction of the Seate and Sengu, where many of his clansmen, living on farms in the Orange Free State and Natal, joined him, and proceeded to cultivate any available ground he could find in the elevated mountain valleys.

The chief object of the tour of which I subjoin an account was to visit these people and see how they lived.

At midday on the 15th of October, accompanied by an officer of the Basutoland police, together with representatives of Letsie, Jonathan, and Joel Molapo, I left Butha Buthe, the northernmost police station in Basuto Land. Our party consisted of seventeen men and thirty horses. As supplies of meat could only be obtained at certain points on the route, it was necessary to take bread and groceries to last for three weeks to allow for detention by swollen rivers. Each of the followers took with him also a supply of maize, ground very fine, roasted and mixed with sugar or salt. A quantity of this is always carried by Basuto when journeying or campaigning, and is often their main sustenance for weeks at a time.

So little is yet known of the mountains by Basuto living in the plains that it was impossible to find a guide for any considerable distance. I had therefore to be dependent upon those picked up at villages *en route*, who, as a rule, were ignorant of every place beyond their own grazing and hunting ground and the road to the chief to whom they owed allegiance.

In the evening of the 15th we got to the village of Molupi, a headman living under the chief Joel Molapo; thence, ascending the Hololo, a tributary of the Caledon, E.S.E., arrived at the foot of a steep pass called Rahane, reaching the top in four hours and a half. This proved to be on the water-divide between the Orange and Caledon rivers, 8300 feet above sea-level. At the foot of the pass to the east we crossed a strong stream called the Malibamatsu (black fountain) rising near the sources of the Caledon and forming a principal source of the Semena, which joins the Orange river. An indistinct cattle path leading south by east, parallel to a rivulet tributary of Malibamatsu, was then followed for an hour and a half to a ridge 8900 feet above the sea, dividing the Malibamatsu from its tributary the Motete, at which we arrived after an hour's further ride and there slept.

The country after leaving the Rahane was wild and bleak, and is

said to be quite uninhabitable. The contours of the hills were rounded ; snow lay in patches ; the grass was coarse and tussocky, and the exposed ground was either peat, sandstone, or sandstone gravel, clumps of everlasting flowers here and there relieving the neutral mountain tints. A few hartebeest and Vaal rheboks were seen, and several coveys of grey francolin (Cape partridges) flushed under the horses. The track in many places was undermined by small rats with white breast and belly, some being occasionally seen sunning themselves on the stones outside their burrows, which were rounds of grass and rubbish piled up, so the guide said, since the melting of the snow.

Two hours and a half from the Motete we reached a crest called Motai, at an elevation of 10,450 feet, and then, leading the horses, struck into a well-beaten bridle-path — Mopedi's — which is the road from Witjes Hoek, in the Harrismith District O.F.S., to South Basutoland. The scenery at this point was very fine. To the north, as far as could be seen, extended the bleak country already described ; to the east a river valley with precipitous sides barred the course ; while to the south no limit could be traced to the billowy sea of peak and crest.

Continuing Mopedi's road for two hours nearly due south, the path began to descend, and led into a narrow valley with deep grassy sides that met in the bed of a little rivulet. Two hours and a half thence brought us to a cattle post of the chief Joel Molapo, elevation 6630 feet.

In descending, the soil became finer and the grass sweeter. At the cattle post, in charge of a head-man named Lekunya, the grazing was good and a quantity of land was under cultivation ; the wheat looked well in ear, and the maize and millet were just appearing above ground. An hour and a half's ride further on is found Ledingwana's place, situated in an extensive valley intersected by deeply cut watercourses. The soil there is principally a fine gravel. We stopped at Ledingwana's one day.

Three miles south of our camp we found the junction of the principal sources of the Orange river, the eastern, called by the Basuto Sengu (the river), the name they apply to the Orange river, and a smaller stream the Seate. The general course of the Sengu is north and south. From Ledingwana's is distant three days' journey in a direction S.S.E., Bushman's Pass, by which Langalebalele entered Basuto Land in his flight from Natal.

On the morning of the 20th, leaving our camp, we ascended the course of the Seate in a north-westerly direction for two hours, until reaching the most advanced cattle post, whence there was neither track nor foot-path to guide us. Continuing the course for five hours more, and crossing the stream fourteen times, we encamped on its banks at an elevation of 6940 feet. During the day fresh spoor of eland was seen, and occasionally sight of otter. The scenery round the camp was very grand. The valley, at first some miles in width but traversed by spurs, had become narrow, until finally there was little room left to ride between

the stream and the bases of the hills, which rose abruptly thousands of feet on either side.

Next morning our course lay along the river for an hour; thence leaving it we entered a ravine, breaking eastward, the sides of which were steep grass slopes, ending in a precipitous fall in some places hundreds of feet to the stream below. The riding was rough; the stones dislodged by the ponies in their scrambles bounded into the water far beneath in such an audible manner as would have shaken the nerves of plain bred horses, but in no way affected our tough little mountaineers. It took two hours ascending through this ravine to the water-divide of the Sengu and Seate, at an elevation of 10,650 feet, from which point were revealed the plains of the Orange Free State with Harrismith Hill in the foreground, the northern portions of Natal and Zululand, and the long line of the Drakensberg extending towards the Transvaal, the morning clouds giving them the appearance at the first glance of a gigantic snow-clad range.

In the near distance a singular knife-shaped cliff standing prominently out and riven in some places from top to bottom was pointed out as being near the sources of the Sengu. The cliff, which took an hour and three-quarters to reach, proved to be a prominence on the precipitous wall, that for some 50 or 60 miles, without a break, forms a barrier between Natal and Basuto Land; below it we looked down some three or four hundred feet of perpendicular rock upon a singularly broken country surmounted by a solitary bluff, grass topped, but inaccessible, apparently rising the same altitude as the cliff. The picture was made wilder by a rift, 50 or 60 feet across, running the entire depth of the cliff, and having no visible outlet at the bottom. In the broken country on the Natal side rises a branch of the Tugela, whose falls could be indistinctly heard a few hundred yards distant on the Basuto Land side. A swamp, about a mile in diameter, situated in a depression of the mountain, gives rise to the Sengu; and here at an altitude of 9560 feet is the divide between the Atlantic and Indian Oceans.

Following the course of the Sengu, which at its source is a mere rivulet, for four hours and a half, we encamped for the night, killing an eland *en route*. Next day the same course was observed for three hours and a half, and after crossing the water-divide we struck the cattle post left two days before.

The beds of the Sengu and Seate are of hard rock, red or green in colour, profusely studded with amorphous fragments of felspar; the tops of the hills are of very coarse sandstone. Three ranges divide the united Sengu and Seate from Natal. The streams taking their rise in these hills and joining the Sengu before its junction with the Seate are called Koakoatsi, Tlanyaku, Moremoholo, Mokhothlong. The Moremoholo rises near Bushman's River Pass, and it was along its course that the chief Langalebalele fled.

About the village of Ledingwana the soil is gravelly on the heights, though good arable land is found in patches close to the rivers. Here and there we observed little heaps of pebbles, the largest about the size of a pea, that appear to have been removed by large black ants when making their galleries. Owing to early frosts the people settled in this neighbourhood had reaped but one crop of maize or millet during the four years they had cultivated; but wheat, potatoes, and lentils had done well. Cattle and horses, many of which had been brought from the low countries of Natal and East Griqualand, seemed to suffer from the bleak winds and coarse food of the mountains. Sheep, however, lately introduced, promise to succeed.

Leaving Ledingwana's at 7 a.m. on the 24th, we again skirted the river, finding reeds and willow trees in abundance. Formerly all the mountain streams were lined with willows, but they have been wastefully used for building and firing purposes. An effort is now being made to preserve the residue.

After five and a half hours' ride the last of the Batlokoa villages was passed; then came those of the Basuto living under the chief Tlakanelo, and eleven miles further on the junction of the Semena and Orange river.

The Semena takes its rise near the sources of the Caledon, and has perhaps the largest drainage of any of the head waters of the Orange river. On reaching the Semena, though the main river was comparatively low, we found it in flood, and were unable to take the usual road which follows its course, but had to make a detour which took five hours and a half, and thus doubled the distance by the direct route to Tlakanelo's village.

Tlakanelo is a petty chief, placed by Letsie in charge of numerous cattle posts; his place is one day and a half from Matatiele by a pass—Leteba's—bearing 165°. Within a few miles of the village is the cave Sehonghong, formerly the home of the last Bushman chief, Soai, who ruled in the Lesutho. It is a simple overhanging rock, the wall in rear being covered with pictures of hunting scenes, war dances, predatory expeditions, and various wild animals. Eland, hippopotamus, and the smaller buck are all recognisable, while occasionally is depicted the uncouth form of the Rain-god. In all the fighting pictures the Bushman is shown victorious. He is drawing his bow with tiny hands, or balancing himself on shapely feet, throwing the assegai. His foes, on the other hand, are exhibited with disproportionally big hands, fleeing on calfless legs stuck like broom-handles into the middle of their feet, and in the rear appear Bushwomen and boys driving herds of horses and cattle, the spoils of victory.

These Bushmen were thorough Bohemians in their habits. The only traces of cultivation found by the Basuto expedition that finally exterminated them were a few little plots of tobacco near their caves.

When hungry they hunted, and when too lazy to hunt they stole. They cared not to keep domesticated animals, and ate those captured as quickly as possible, first sending a portion to the Baphuti chief Moirosi, who had married in a left-handed manner some of their women, and to whom they acknowledged a sort of fealty. The best of the captured horses were used for the chase, but when unsuccessful, they were eaten. Their most formidable weapons were arrows having poisoned heads; the secret of this poison is said to be known to some of the native Basuto doctors.

Remaining a day at the Orange river, and finding it passable, we crossed it, and riding three hours and three-quarters in a direction 320° , arrived at the top of the range bordering the river valley, 9550 feet, passing the principal cattle posts of Letsie, where the horses and cattle were to be seen grazing unherded on the slopes, the only cultivation being adjacent to villages.

A descent of the west side of the range was then made to a small stream flowing into the Mantsunyane, called the Lesobeng, along which we rode for an hour and three-quarters; then taking a westerly direction, ascended a slope for an hour and a half. Here, at an altitude of 9680 feet, was an extensive moorland, bleak and exposed, with coarse and patchy grass.

In the absence of any path a westerly course was next struck, and after skirting a number of forbidding looking bogs, amongst which the Mantsunyane rises, two hours' ride brought us to the head of a winding valley, following which for three hours and a half we came to the Mantsunyane, a strong stream having banks at the point of crossing 500 feet high. In this part many hartebeest were seen.

A ride of three hours, mostly along the hill-tops, led to the Sengunyane, which, joined by the Mantsunyane, flows into the Orange. Five hours further on is the ridge separating the Sengunyane from the Makhaleng (Cornet Spruit), whence could be seen the hills bordering the Orange Free State. We now fell into a well-beaten halter path; every plot of ground capable of cultivation was ploughed, and the numerous kraals in which the stock was confined at night showed that we had left the country where cattle is king.

Three hours' ride from the Divide brought us to the Makhaleng, a strong stream which for some twenty-five miles before it joins the Orange, forms the boundary between the Orange Free State and Basuto Land. Crossing it we rose a pass called the Lesobeng, at an elevation of 6940 feet, and then steadily descending reached the foot of the Drakensberg, near the Roman Catholic mission station at Roma, 18 miles from Maseru. Maseru is 4780 feet above sea-level.

The whole tour occupied sixteen days. Nearly 400 miles of country were traversed, a large portion of which, I understand, had never been visited by a European. There were few places where it was not prac-

licable to ride. It appeared that most of the summits, if approached with judgment, could be ascended on horseback, though of course the animals used must be of the sturdy stock habituated to the mountains. The highest point attained was 10,750 feet above sea-level; but from thence, both north and south, distant heights appeared of greater elevation.

There are certain recognised passes and bridle-paths through the mountains; when those are left it is well to have guides. The bogs on the mountain-tops are treacherous, and from the broken nature of the country the compass affords little assistance. Frequently it takes a whole day to reach a point which in the morning appears to be distant but an hour's ride.

NOTE.—The observations on which the heights given in this paper are founded are not known. Colonel Fox, of the Intelligence Department, states that he has no information how they were determined by Sir M. Clarke, but he adds that he has little hesitation in adopting them in preference to those previously given.

On the Influence of Arab Traders in West Central Africa.

By Lieut. H. WISSMANN, Gold Medallist, R.G.S.

(Read at the Evening Meeting, June 25th, 1888.)

I PROPOSE this evening to place before you certain facts illustrative of one of the most urgent questions of the day, viz. the influence of the Arab traders in Central Africa. I invite you to accompany me into a region of Central Africa, where neither Arabs nor Europeans had intruded in 1881, when I first visited it. Regions like this enable us to study the spontaneous development of a race, which has learnt to know strangers from afar only in the shape of traders or slave-hunters, who are anxious, above all things, to enrich themselves at the expense of the native populations.

The region I refer to is bounded by the Sankúru and the Lomami, the former first crossed by Mr. Pogge and myself, the latter first made known through Commander Cameron. This region is inhabited by the Bene Ki, a division of the Basonge. It forms a rolling savannah, intersected by numerous rivulets, which have excavated their channels to a depth of 150 feet through darkish-red laterite, whose colour contrasts pleasantly with the more sombre hues of the grasses. Down in the bottom of these ravines may be seen the underlying sandstone, bedded horizontally, and often dyed ruddy by particles of iron. A narrow strip of luxuriant primeval forest accompanies the crystal streams of cold waters. A bird's-eye view of this country would present the appearance

of richly veined marble, the forests fringing the rivulets representing the darker streaks, the open savanna the body of the rock. Standing on a point of vantage, our attention is attracted to darker stripes which wind like huge serpents along the heights of land, and which, on a near approach, turn out to be palm groves, in the shades of which are built the large villages, or rather towns, of the Bene Ki.

The stout trunks and lofty crowns of these oil and wine palms are ample evidence that villages have existed here for decades in peace and security, and that war and slave-hunts, pestilence and superstition, have not a frequent change of residence, as has been the case in neighbouring districts to the east and west.

One day, in January 1882, we find ourselves encamped near the western entrance of one of the largest of these towns, which happens to be occupied by the clan of the Bagna Pesihi. Early in the morning there resounds through our camp the cheerful cry of "Sanguleme" (let us take up our loads). Dr. Pogge, myself, and our black interpreter mount our oxen, which have rendered such excellent services throughout Equatorial Africa. I, as usual, rode at the head, whilst Dr. Pogge with the interpreter brought up the rear, the more responsible post. We move along a broad path, evidently much frequented. The nineteen men who had come up with us from the coast, and the Baluba, who, in child-like confidence, had attached themselves to the first white men whom they had seen, quickly close their ranks. Our procession, numbering altogether 200 souls, including the 60 women of the Baluba, and some forty men armed with guns, soon disappears in the cool shade of the palms; the road gradually widens until it is 60 feet broad. Glades on either side afford glimpses of the homesteads of Bagna Pesihi; each of these homesteads accommodates a family, and consists of four or five carefully built grass-huts, rising to a height of 20 feet, and surrounding a sort of courtyard. This yard is kept scrupulously clean. The huts occupy a substructure of loam, firmly trodden down, which keeps out moisture. The doors, which are about the height of a man, are shaded by a porch. In shape, the huts are square, each side measuring about 20 feet.

The interior is divided into two compartments, one of which contains two raised bedsteads, neatly made of the bark of palms. The furniture of the dwelling-room consists of carved wooden stools; the floor and the walls are covered with grass mats, and along the latter are ranged a large shield resembling a door, bows and arrows, a gourd for palm wine, and a huge clay vessel for water. A huge shelf, suspended to the roof, affords room for nuts, palm fibres used for weaving, skins, dried maize and millet. The wooden mortars for pounding the corn may be seen in the courtyard, as also, somewhat aside and between two trees, the native loom, and the toys of the children, for this yard is the playground of the younger generation. Gardens occupy the open space between the

homesteads, where wild hemp and tobacco, tomatoes, red pepper, gourds, pineapples and sugar-cane, ricinus and other medicinal plants are cultivated. A thicket of bananas and plantains occupies the back of each homestead, and passing through the shady palm grove, which supplies its owner with nuts, oil, wine, and fibres, we look across the fields down to the valley and its rivulets. Among the Basonge these fields are cultivated by the men, and yield sweet potatoes, ground nuts, maize, manioc, and millet, which is used for making beer. The women, on the other hand, attend to the lighter domestic duties, and fetch wood and water.

Each homestead, with its farm, occupies thus a long strip of land, extending from the village street down to the rivulet, and bounded by well-defined paths, used by the carriers of water. Pot-bellied goats with short legs, sheep, and a multitude of fowls, move freely about this estate. No one appears to be in fear of thieves.

The day of our arrival was quite an event. Two white men, with long straight hair, and one of them, viz. Pogge, with a waving beard, had come from the unknown country near the setting sun. They ride on strange animals, resembling buffaloes (for cattle are not known here), and make these huge creatures obey them as if they were dogs. Rumours spread that they are the sons of the spirit, Bena Kalunga, who have risen out of the water.

Reports have already reached this country that although these strangers are armed with dreaded fire-arms, like the Bakalanga (Arabs) in the East, they are nevertheless good people, who do not like war, and pay for all they require, instead of helping themselves and laying waste the country. The people have gathered, full of expectancy, in front of their homesteads. The men, tall and muscular, though rather obese, are fully armed, but bear themselves modestly; the women, equally tall, but more slender, quite devoid of barbarous ornaments and only slightly tattooed on the belly and the back, cling to their natural protectors, their eyes wide open, and the hand held before the open mouth in sign of deep wonderment. Well-fed children peep at the strange white men from hiding-places in the shrubs, or from narrow doorways. A deep silence reigns throughout, and none of the shouting, running, and pushing, so observable among other tribes, was to be observed. It was clear that the astonishment exhibited was not quite free from apprehension. When I looked around me and noted the smallness of our numbers, it struck me that these multitudes, if so disposed, might crush us before we could make use of our weapons.

Our Baluba, however, appeared to appreciate the impression which we had made. Those among them who had no arms went along chattering gaily, carrying their tremendous hemp-pipe suspended to a string, for those addicted to the cult of hemp-smoking are not allowed to carry arms except a gun.

Homestead followed homestead in never-ending succession. In a

kindly voice I called upon the natives standing along the road, "uta pash, ka vita" (arms down, no war); and my efforts soon met the support of several ancients who accompanied me, and removed the last remaining traces of distrust. From half-past six in the morning until eleven o'clock we passed without a break through this street of the town; and when we left it in an easterly direction it still extended, adapting itself to the features of the ground towards the south-east. If I assume that we marched at the rate of two miles an hour, this town of Bagna Pesihi must measure nearly ten miles in length. We camped below it close to the rivulet. Our camp was soon filled with so many strangers desirous of trading, that the intercourse with our own people was effectually put a stop to. We estimate that between four and five thousand townsmen of Bagna Pesihi must have visited us. Supplies being very abundant we bought cheaply. A fowl could be purchased for a large cowrie shell, and a goat for a yard of calico. The finest specimens of my collection, such as openwork battle-axes inlaid with copper, spears, and neat utensils, were acquired by me in these villages of the Bene Ki.

On the following morning we continued our march—no discord had disturbed our intercourse with these gentle savages. Cheerful, with full bellies (a *sine quâ non* if negroes are to be cheerful), and laden with provisions, we went our way, bearing in kindly remembrance our friends the Bagna Pesihi.

Four years had gone by when I once more found myself in the centre of Africa: this time at the head of a large caravan of close upon a thousand people, and accompanied by the Belgian Lieut. Le Marinel and Mr. Buslag. Dense inhospitable forests, inhabited by savage Bene Mona and scattered Batwa—the bushmen of these regions, had compelled us to take a more southern course. It was with joy that we at length once more beheld the broad savannas of the Bene Ki, where we hoped to be able to recruit our strength in prosperous towns, and to receive compensation for the hardships which we had undergone.

Once more we camped near the large town of the Bagna Pesihi. Early on the following morning we approached its palm groves. The paths are no longer clean, as they used to be. A dense growth of grass covers them, and as we approach the skirt of the groves we are struck by the dead silence which reigns. No laughter is to be heard, no sign of a welcome from our old friends. The silence of death breathes over the lofty crowns of the palms, slowly waving in the wind. We enter, and it is in vain we look to the right and left for the happy homesteads and the happy old scenes. Tall grass covers everything, and a charred pole here and there, and a few banana trees, are the only evidences that man once dwelt here. Bleached skulls by the roadside, and the skeletons of human hands attached to poles, tell the story of what has happened here since our last visit.

The Bakalanga, in the long white garments and with cloths wound round their heads, had been here, so we were told subsequently.

The hordes of a powerful chief, said to live to the east of the Lomami, known indifferently as Tupa Tupa, Muchipula or Tippu Tib, had been here to trade. Many women had been carried off, all who offered resistance had been killed, the fields, gardens, and banana groves had been wasted; and the palms only had escaped the fury of these visitors. Twice more, at intervals of three moons, these destroyers had returned, and the havoc which they wrought had been completed by the small-pox which they imported and by famine. The Bagna Pesihi—nay, the whole tribe of the Bene Ki—had ceased to exist. Only a few remnants of this once powerful tribe, so we were told, had sought a refuge with a chief on the Sankuru, named Zappu Tapp, himself a refugee from Arab aggression.

You may readily imagine the indignation with which the sights we saw filled us, and can readily understand the detestation in which I hold such wholesale destroyers of human life and happiness. Day after day we were called upon to witness the same abhorrent scenes, until one day, on the banks of the Lukasi, we came upon a camp of these Arabs. They numbered three thousand men, and their leader was Sayol, one of the lieutenants of Tippu Tib. It was with difficulty that I led my people thus far, for they had suffered much hunger in the primeval forests and when crossing depopulated districts. We had lived on the pith of palm trees, and even fruits reputed to be poisonous were not despised, yet hardly a day passed without one of my faithful Baluba dropping down dead from exhaustion. Only he who was responsible for the lives of his subordinates can appreciate what I suffered in these dark days.

Emaciated and worn down, these poor villagers still look up to me in the vain hope that I should be able to improve their position. And whose the guilt, but of those devastators of regions which before their appearance could be traversed in security by caravans numbering their thousands?

After a short and stormy interview with Sayol we camped near to him. I even then noticed that the conduct of Tippu Tib's people was different from what it used to be, and it was only when I arrived at Nyangwe that I found this change was due to the deplorable fights with Europeans at Stanley Falls.

I paid a visit to Sayol's camp. A scaffolding of beams, at its entrance, was ornamented with fifty hewn-off right hands. Musket-shots, later on, proclaimed that the leader of this gang was practising musketry upon his unfortunate prisoners. Some of my men told me that the victims of this cruelty had been cut up immediately to furnish a cannibal feast, for Tippu Tib's auxiliaries from the Lomami, the Bene Kalebwe and Batetela, are cannibals. Greatly agitated, I considered whether it would

not be possible to punish this band of murderers, but the condition of my caravan precluded every prospect of success. Nay, I was myself dependent upon the goodwill of this vile leader of a slave-hunting party for a return to the depopulated districts, which we had only just crossed with difficulty, whilst the country in front could be crossed only with the aid of guides furnished by Said.

But let us turn aside from such mournful episodes, and ask ourselves, How can these regions be made participators in the blessings of civilisation?

Self-sacrificing Christian missionaries have proved blessings to some of the coast districts; but it is clear that natives, who are not sure for a single day of their lives and property, are not in a condition to open their hearts to higher and nobler religious ideas. The civilisatory mission needed is one which will free these tribes from the cancerous evil which poisons their very life-blood, and must inevitably lead to their total extinction. This is a work requiring large means, but it is one of the noblest. It must be undertaken quickly too, for the disease is spreading rapidly, and the influence of the Arabs grows visibly from day to day.

Before the paper:—

Sir FRANCIS DE WINTON said he not only knew of Lieut. Wissmann's adventures and the work he had performed as an explorer, but he could speak of him as a personal friend. There were two kinds of friends; one consisting of those who were made in civilised communities, and the other of those who were made in the heart of Africa. Somehow those who became friends under the latter exceptional conditions were bound more closely together than if the friendship had arisen in the ordinary circumstances of life. He first met Lieut. Wissmann in Central Africa, and noticed in him not only great amiability of character, but a singular honour and great modesty. He had met few explorers who combined the amount of energy which Lieut. Wissmann had shown in his travels, with such modesty and reticence as to his own part in the many enterprises which he had conducted to a successful conclusion. Lieut. Wissmann began his career as a traveller in 1880, when in conjunction with Dr. Pogge he penetrated as far as the Baluba country. Dr. Pogge remained there, but Lieut. Wissmann determined to try and find a way from the west coast to the east coast, and he had so attached to himself the tribes with which he was then living that many of them followed his fortunes as far as Nyangwe, from which he went along the trade routes and came out at Zanzibar in 1883. His exploits so attracted the notice of the King of the Belgians that he was requested to take charge of an expedition which had for its object to take possession of territory on behalf of the Association Internationale. Though Lieut. Wissmann had only been five months in Europe he did not hesitate to accept the command, and with four other whites he arrived on the west coast in 1883. Some difficulty was experienced in passing through the Portuguese territory, but he finally got to his old friends the Baluba, and in 1885 he (Sir Francis de Winton) had the pleasure of welcoming him at Leopoldville, after he had discovered the largest affluent of the Congo, the Kassai. At that time he was suffering from asthma, and he went to Madeira where he stopped five months, but he was back to the Congo the same year, and then he crossed to Nyangwe with the intention, if possible, of working northward towards

Emin Pasha. Unfortunately the Arabs were then very hostile to white men, and made him a prisoner for three months, after which they allowed him to proceed, and he came out at the Shiré in September 1887, having twice crossed Africa,—a feat which no other white man had accomplished. Among those who had received the Gold Medal of the Society there were very few who had excelled Lieut. Wissmann in advancing geographical knowledge.

After the paper:—

Mr. RAVENSTEIN said that among the travellers in Africa who represented the very best elements of European civilisation, Lieut. Wissmann must take high rank; not so much because he had crossed Africa twice, as because wherever he had gone he had collected useful information and put it into such a shape that it could be embodied in the general stock of knowledge. The Baluba tribe had undoubtedly played a tremendous part in the history of Central Africa. Those who had seen the collections of specimens in Berlin, which had been brought home by travellers, would marvel how reputed savages produced such work, which would compare with that of Sheffield or other centres of European industry. Who were the people that did it? Surely not coast tribes. They must have been some such tribe as the Baluba, the chiefs of whom established at least two great empires. The history of such a people was worth inquiring into. From the ancient records of the Portuguese, it appeared that in the sixteenth century there was a commotion in Central Africa, by which the interior tribes were driven to the coast, and made their appearance near Angola, and on the East Coast. The existing empires in Europe might celebrate their tenth century, but the African kingdoms had no records, and disappeared more rapidly. Was it not possible to reconstruct from scattered materials already existing, hearsay information, and tradition, a history of one of the great tribes of Central Africa? The traditions along the West Coast appeared to lead to some common agreement, which would make it possible for men like Lieut. Wissmann to add an interesting chapter to the history of the human race.

The PRESIDENT proposed a vote of thanks to Lieut. Wissmann for the extremely interesting account he had given of the people he met with in his journey across Central Africa. His graphic description of the country and its inhabitants and his truly philanthropic views with regard to the people who had been preyed upon by the Arabs from the north, were alike worthy of our praise. It was not for him to say to what extent England and other civilised countries could co-operate to put an end to the atrocities which were still perpetrated in Africa, but that result would doubtless in the long run be accomplished by the more complete exploration and subsequent occupation of the country by a superior race.

GEOGRAPHICAL EDUCATION: THE YEAR'S PROGRESS AT OXFORD.

THE following Report on the Progress of Geography at Oxford during the year was received by the Council, at the last meeting of the Session.

OXFORD, June 22, 1888.

GENTLEMEN,—I have now completed the first year of my tenure of the office of Reader in Geography in the University of Oxford. As that office is due to the initiative of the Royal Geographical Society, and is in part maintained by it, I think it well to inaugurate a practice of presenting to the Society at the end of each academical year a report of the progress made.

This year has been one mainly of reconnoitre and preparation. Both I felt to be very necessary. Reconnoitre—because geography is of course an underestimated subject, and the competition of even recognised subjects in the University is very strong. Strong action of any sort tends to be weakly supported, and to be opposed by many interests. Ill considered action might do irreparable harm; therefore, I feel it my best plan to mature schemes and wait for opportunity. Preparation has been necessary—because I imagine that in the present state of geographical study in this country, considering the few opportunities of acquiring experience in the higher teaching of the subject, any one appointed to a university chair would feel it his first duty to review and systematise his knowledge.

The actual results attained, however, are, considering the circumstances, I venture to think, fairly satisfactory. I have delivered forty-two ordinary lectures in the University, and one public lecture. In each of the three terms I have lectured twice a week for seven weeks. There have always been two courses going on at the same time, on different days of the week. Without sharply differentiating physical from political geography, I have found it necessary with the present examination arrangements to impart to one course a scientific bias, to the other a historic bias. The Boards of Faculties have favoured me in this matter by allowing me to publish my notices in the lists of two separate faculties, natural science, and modern history.

On the scientific side I have lectured in all three terms on what I have ventured to call the “Principles of Geography”—a review of the subject not merely physical, yet taking the feature and not the region as the basis of classification. This course has not been nearly so well attended as the other. It fits in even partially with no recognised course of study in the University, unless *in part* with that of geology—and the geological students may be numbered on the fingers of one hand. Still, I have never been without an audience, a fate not altogether unknown just now to Oxford Professors and Readers, and I shall continue to devote one course of lectures to such subjects until that fate befalls me, as I regard physical geography as the foundation of the whole subject. Moreover, such lectures are essential to the two or three specialists of whom I will speak presently.

On the historical side, I lectured in the first two terms on “The Geography of Central Europe;” in the term just passed, on “The Influence of Physical Features on Man's Movements and Settlements.” These lectures have, on the whole, been well attended. On occasion, the audience has risen to as many as forty, partly men, and partly ladies.

My aim is to furnish general instruction to as large a number as will favour me with their attention, and also to have always round me two or three whom we may style specialists. I can only say that I now see a very fair prospect of obtaining the latter. It may be well to place on record my humble opinion, that the best preliminary training for a geographical *specialist* is a sound grounding in general science, and superadded to this an elementary knowledge of history. I have found by experience that it is exceedingly hard to give the necessary scientific knowledge to a historian.

As regards apparatus, the curators of the schools have placed a good lecture-room at my disposal in the University Schools. But beyond a black-board, and a few borrowed maps kindly lent me from the Society's Educational Collection, I am totally without the necessary means of illustration. I have felt it necessary to show that I should have a permanent class before asking for any considerable expenditure. My next care will be to find some means of remedying this glaring defect.

My public lecture was on the “Natural Roads and Sites of Towns in Southern

Germany." It was fairly well attended, and the audience included several of the more prominent seniors of the university.

For the coming academical year, I have advertised courses of lectures on "The Physical Geography of the Continents;" on "The Geography of the British Isles with special reference to History;" and on "The Historical Geography of North America." Under the head of Geography, you will be pleased to hear that lectures are announced for next year by Professor Freeman on "The Historical Geography of Europe," and by the Reader in Indian History on "The Geography of India."

In the interests of our cause, I have felt it incumbent on me to seek influence as an examiner. As some of these examinations are still pending, I feel precluded from mentioning them. I add to this report, however, one paper set for an examination which has been held.

As an adjunct to my Readership, I hold the appointment of Extension Lecturer. In this capacity, I have during the past winter given 102 lectures on geography and physiography in the following towns:—Barnsley, Worksop, Leek, Bath, Taunton, Bridgewater, Enfield, Tunbridge Wells, Ashburne, and Banbury. The average aggregate attendance has been about 2000. In the examinations after the courses 136 certificates have been awarded; 55 first class, and 81 second. Mr. Bates was the examiner. For the purpose of illustrating these lectures, we have had constructed, with part of the Society's grant, about 150 lantern slides—maps, diagrams, and typical views. Lectures which I am to deliver have been arranged for the coming winter at the Cambridge centres, Exeter and Plymouth, and the Oxford centres, Torquay, Wolverhampton, Banbury, Brighton, and Tunbridge Wells.

H. J. MACKINDER, M.A.,
Reader in Geography.

GEOGRAPHICAL NOTES.

Partial Ascent of Mount Kenia by Count Teleki.—We are informed by Colonel Euan Smith, our Consul-General at Zanzibar, that an expedition under the command of Count Teleki, a Hungarian gentleman, which left Zanzibar early in 1887, reached Lake Baringo in December last, having followed generally the routes taken by Thomson and by Dr. Fischer. Count Teleki had, like Dr. Fischer, some unpleasant experiences with the people of Kikuyu, with whom he had to engage in a series of combats. From Lykipia he made an excursion to Mount Kenia, which he ascended to a height of about 15,000 feet, the limit of eternal snow. He believes its height to be greater than that of Kilima-njaro; Thomson's estimate of the altitude of Kenia was 18,400 feet. According to Count Teleki's description it is a snow-covered volcanic elevation, the crater of which has a diameter of about $4\frac{3}{4}$ miles; from its broken edge two peaks rear themselves. The traveller was on the eve of departure on a further journey to the Samburu country, where he intended to visit Lakes Basso Ebor and Basso Erok, as he calls them.

Rainfall and Temperature on the Gold Coast.—The following statistics of the rainfall and temperature in the Accra district are taken from a recently published collection of sanitary and medical reports by
No. VIII.—Aug. 1888.]

2 o

Government officials on the Gold Coast. The period embraced is the eleven months ending December 1886, during which time the total rainfall was only 22·73 inches. The figures for the different months were as follows:—February 1·55, March 6·83, April 4·4, May 2·92, June 2·4, July ·28, August nil, September 2·0, October 1·09, November ·96, December ·3 inches. The report states that the scarcity of water arising from this small and uncertain rainfall caused great inconvenience. Although the amount of rainfall was so small in Accra, there was an abundant fall throughout the year in the Aburi-Akropong range of hills, situated at varying distances of from 15 to 40 miles from Accra. From a consideration of the meteorological charts appended to reports, it appears that the mean average maximum shade temperature varied between 82° and 87° F., the highest shade maximum temperature on any one day being 91° and the lowest 80°. The mean average minimum shade temperature varied between 71° and 78°, the highest on any one day being 85° and the lowest 65°. The highest reading of the solar maximum thermometer was 164° and the lowest 132°, while the mean average terrestrial minimum temperature varied between 60° and 70°. The average relative humidity ranged between 67 in June and 87 in September, but the daily oscillations were most marked. The average daily range of temperature varied from 12° in February to 16° in December, being greatest in the two last months of the year. The year 1886 was the first year in which meteorological observations were properly registered at this station.

Lidsky's Journey in Karateghin.—M. Venukoff has communicated to the Geographical Society of Paris a few facts with regard to the explorations made by M. Lidsky, a member of the Society of Naturalists of St. Petersburg, in Karateghin and the eastern part of Bokhara. The traveller arrived in the month of June last at Shahr-i-sabz. From this point it was his intention to penetrate to Hissar by the Sangardak ridge, but this passage being barred by the snow he was compelled to make a détour and enter the valley of the Surkhan by another route. The vast prairies stretching to the Oxus are uninhabited save by jackals, for the waters of the Surkhan inundate the plain every year. Ascending along this valley the traveller reached Garm and Karatagh, the summer residence of the Bey of Garm, whence he pushed on to Faizabad. At the two last-named places the traveller observed fish with skin of exactly the same colour as the water in which they lived, which contained reddish clay. Beyond Faizabad he penetrated into the upper Dashti-Bidona valley; this is a plateau separating the basins of the Surkhhab and Kafirnahan, and is one of those "pamirs" or "syrtes" so frequently met with in this part of Asia. M. Lidsky describes Karateghin as very fertile in its low-lying parts; the mountains are clothed with forests. Snow is very abundant in this oasis. The beasts of burden, and even the men sank deeply into the snow, and the party were often obliged to

lay down long pieces of felt to walk upon, a mode of travelling at once slow and costly. M. Lidsky has prepared an interesting account of his explorations in this region, and of the scientific results which have accrued therefrom.

The Overflow of the Yellow River of China.—The recent outbreak of the Hoang-ho and the means to be adopted to prevent a repetition of this enormous calamity are discussed at considerable length by Mr. E. L. Oxenham, our Consul at Chinkiang, in his Report for 1887 on the trade of his consular district. With regard to the Yellow river being allowed to continue along the course it has now assumed, which is identical with an old bed of the river, the Consul says:—"The consequences to this province (Kiang-su) of the divergence of the Yellow river into its old and more southern bed cannot fail to be pregnant with disaster to the eastern portion of North Kiang-su. The country there is below the level of the Grand Canal. This district is highly cultivated, and permeated with streams, channels, and creeks for the irrigation of the soil for rice cultivation. The land is in addition thickly populated, and a flood would inflict as great, perhaps even greater disasters on East Kiang-su than have accrued to Ho-nan and An-hui, owing to the low level of the country. The three great lakes bordering on the canal are fed during the summer by the overflow of the Yang-tsze, and in times of flood in that great river the lakes themselves are a source of danger to the dykes of the canal. The addition to such high waters of the flood-overflow from the Yellow river, equal if not exceeding in volume the surplus water from the Yang-tsze, would entail disasters and miseries terrible to contemplate over the whole of North Kiang-su. The Chinese have exercised a wise precaution in keeping the Yellow river in its present northerly channels; nothing but evil can accrue if it be allowed to come south." The original breach in the river banks in Ho-nan was when the Consul wrote (April 1888) growing larger, and was already over a mile broad. Efforts were being made to fill up the gap, but were proceeding very slowly. Even if the work were completed in time to prevent another outbreak, the remedy would only be temporary, and would leave the real source of the evil untouched. In the opinion of Mr. Oxenham the most promising plan for effectually dealing with the question is the proposal "to reafforest the hills in Shan-si and Shen-si, which are at present barren of wood. A more equable rainfall would thus be insured, and less earth would be swept down into the river by torrents. It is the immense silt deposit that makes the Yellow river so difficult to control and the level of its bed so difficult to preserve. The cultivation of the barren desert (by irrigation) which the river at its northern bend flows through, and which supplies so much sand and thus discolours the water, would also be highly beneficial.

Trade and Agriculture in Pernambuco (Brazil).—The Annual Consular Reports (Nos. 371 and 374) for the year 1887 on the agriculture

and trade of the province of Pernambuco and the adjoining provinces of Alagoas, Rio Grande do Norte, Ceara, &c., have recently been issued. Agriculture in each of these provinces is described as being for the most part in a primitive condition. This arises from various causes. The natural fertility of the soil and the amenity of the climate render any great exertions on the part of the cultivator almost unnecessary. The want of labour also, consequent upon the gradual abolition of slavery, is severely felt. However, with improved means of communication, and with the introduction of proper agricultural machinery and implements, the commercial prospects of these provinces will, it is stated, be vastly improved. Certain schemes of immigration are being planned, which, if successful, will also greatly benefit the country. Sugar-cane and cotton continue to be the chief articles of cultivation, and upon the results obtained from their crops the agricultural prosperity of these provinces very largely depends. Coffee, cocoa, maize, mandioca, tobacco, &c., are also cultivated more or less in different parts, but principally for home consumption. It is a fact worthy of notice that out of the total exports for 1887 of the three provinces Pernambuco, Parahyba, and Ceara, which amounted to 2,766,636*l.*, the exports to Great Britain were 1,223,729*l.*, or about 45 per cent. The increase which is shown also in the imports is due to the augmented trade of Great Britain.

REPORT OF THE EVENING MEETINGS, SESSION 1887-8.

Thirteenth Meeting, 11th June, 1888.—Sir HENRY BARKLY, G.C.M.G., K.C.B., in the Chair.

PRESENTATION.—Rev. W. T. M'Cormick.

ELECTIONS.—Sir C. E. Bernard, K.C.S.I.; John C. O'Donnell, Esq.; Capt. Edward Hobart Seymour, R.N., C.B.; James Oates Widger, Esq.; Cunningham Wilson-Moore, Esq.; Lieut. F. E. Younghusband (*King's Dragoon Guards*).

The paper read was:—

"Hudson's Bay, and Hudson's Strait as a Navigable Channel." By Commodore A. H. Markham.

Will be published, with sketch map, in the next number of the 'Proceedings.'

Fourteenth Meeting, 25th June, 1888.—General R. STRACHEY, R.E., F.R.S., President, in the Chair.

PRESENTATION.—Francis Hooper Rawlins, Esq., M.A.

ELECTIONS.—C. Bennett, Esq.; Harry Brown, Esq.; Ethelbert Edward Lort Phillips, Esq.; Francis Hooper Rawlins, Esq., M.A.; A. E. Castle Stuart Stuart, Esq.; William Thompson, Esq., C.E.; Frederic Villiers, Esq.

LIEUT. H. WISSMANN.

Lieut. H. Wissmann, to whom the Patron's Medal was awarded at the recent Anniversary Meeting, was present; having a few days previously arrived from Madeira, where he had been staying for the recovery of his health.

The PRESIDENT, in introducing him, said the gold medal presented to him was an embodiment of the views of the Royal Geographical Society that the work which he had done was worthy of the highest encomium. It afforded him (the President) great pleasure to present the medal to a citizen of a State which had been for so long in the most amicable relations with England.

Lieut. WISSMANN in reply said, "Mr. President, Ladies and Gentlemen: I am here this evening to receive the great honour of the presentation of one of the gold medals of this Society, an honour which I trust I shall duly appreciate. It is to me a most pleasant moment to find that the work of exploration, in which for the last eight years I have been engaged, should procure for me this honour, and I beg now to tender my most grateful acknowledgments. I have also been asked to read to you a paper this evening. It was very difficult for me to do this in the short time I had to prepare this paper, so I throw myself upon your generosity, a generosity which is always given by an English audience. I trust you will forgive, not only the pooriness of the account I am going to read to you, but also the difficulty which I—who only learned what little English I know in Africa—have in expressing myself. Pray forgive me and I will do my best. The paper I have prepared has reference to only a small portion of my travels, but it has the merit of being very short, so it will not tire you; and it will tell you about one of the most interesting people of Central Africa. I think after this speech you will see that with the best intentions I should not be able to convey to you properly the contents of my paper, so I will beg my friend, Sir Francis de Winton, to have the kindness to do so for me."

The following paper, which Lieut. Wissmann had prepared, was then read by Sir Francis de Winton:—

"On the Influence of Arab Traders in West Central Africa." (*Vide ante*, p. 525.)

After the discussion on the above paper, the undermentioned was read:—

"An Account of Christmas Island, Indian Ocean." By Captain W. J. L. Wharton, R.N.

The paper was illustrated by a series of photographic views of the island shown by the dioptric lantern, and by diagrams explaining its singular geological structure and history.

MR. H. M. STANLEY.

On the conclusion of the above-mentioned papers, Sir Francis de Winton, at the invitation of the President, gave the meeting his views on the recent telegrams from West Africa respecting the Emin Pasha Relief Expedition.

He said, "I have been somewhat suddenly called upon to make some remarks concerning the recent reports which have appeared about Mr. Stanley and his expedition, and I must therefore beg your consideration if I fall short of your expectations. There is no doubt that considerable anxiety exists as to the present position of Mr. Stanley: for my own part, I have no hesitation in saying that if nothing has happened to him personally—I mean none of those accidents to which all are liable, whether in Africa or England—he is at this moment either with Emin Pasha or on his way to the East Coast with his caravan. Now in dealing with the recent telegrams I have to offer the following remarks, begging you to understand that I do not wish you to take my theories as what has actually happened. They must be only theories until we receive actual news; but they are given out of a certain experience which I have gained of Central African travelling, and of the knowledge which I have of Mr. Stanley's intentions. In the first place, the recent telegram from St. Paul de Loanda is the news received by Mr. Ward who left the camp of the expedition on the Aruwimi on the 31st March, and who, after a remarkably rapid journey, arrived at St. Paul de Loanda on the 1st May. He sent telegrams

to the Committee, which were published in the daily papers of the 3rd May, and since those telegrams, letters were received by Mr. Mackinnon, the Chairman of the Committee, and myself, from Major Barttelot, Mr. Rose Troup, Mr. H. Ward, and Mr. Jameson. In none of those letters was any allusion made to the truth of the report that Mr. Stanley had been wounded, or that his expedition was either in difficulty or danger. My own impression is that Mr. Ward on his journey down stopped at Leopoldville and mentioned that deserters had come back who stated the above mentioned facts; but as these reports from these deserters were filtered through Arabs, and as none of the above mentioned gentlemen attached any importance to them, they were not reported home, as being only sensational. Now these reports, after being well discussed, found their way to St. Paul de Loanda, where falling into the hands of one of the clever agents of Reuter's Agency, they were dressed up in a very attractive form and issued to the public as fresh news on the 20th inst. There has been no communication with the Haut Congo since Mr. Ward's mission. Now there is another telegram which comes from Suakin; this telegram says that a white man (supposed to be Stanley) was fighting his way to the Bahr Gazelle, and that his movements were exciting great interest at Khartum. This telegram is true and not true: let me show you how this is. Stanley turning north reaches the Monbotto country, Junker's furthest point south. News travels fast; and if he has had opposition in the Mabodi territory, rumour of this would get into the Niam Niam country, and from thence would extend to the Bahr Gazelle, which is only 450 miles from Khartum. So there is ample time for such a report to travel in the manner I have pointed out; but I do not believe that Stanley or his expedition has ever travelled a yard further north than was necessary for him to reach Wadelai. He has not the men, he has not the ammunition, to do more than he undertook in the first instance. In conclusion, I would point out as follows: that it takes from five to seven months for news to come from Emin at Wadelai to Zanzibar."

This being the last meeting of the Session 1887-8, the President, in conclusion, announced that the Society would réassembler for the new Session on the second Monday in November next.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

Gleichen, [Lieut. Count].—The Armed Strength of Portugal. Prepared in the Intelligence Branch of the War Office. London, Harrison & Sons: 8vo., pp. 104, maps. Price 3s. [Presented by the Intelligence Branch of the War Office.]

Hellmann, [Dr.] G.—Die Regenverhältnisse der Iberischen Halbinsel. 'Zeitschrift der Gesellschaft für Erdkunde zu Berlin,' Nos. 135, 136, 1888.

Lespy's Grammar and Vocabulary of the Language of Bearn for Beginners. Abridged and translated by Roger Gordon Molyneux. Pau, Léon Ribaut; London, Henry Frowde, 1888: 8vo., pp. 145. Price 5s. [Presented by the Author.]

Mohn, H., and Hildebrandsson, H. Hildebrand.—Les Orages dans la Péninsule Scandinave. (Présenté à la Société Royale des Sciences d'Upsal le 12 Février 1887.) Upsal, E. Berling, 1888: 4to., pp. 55, maps and diagrams. [Presented by the Authors.]

[**Murray, John.**]—A Handbook for Travellers in Surrey, Hampshire, and the Isle of Wight. Fourth edition. With maps and plans. London, John Murray, 1888: 8vo., pp. viii. and 456. Price 10s.

This edition appears to have been carefully revised. The routes have been rearranged, so as to be in accordance with the new lines of railway, and much of the work has been rewritten.

ASIA.

Bokemeyer, [Dr.] Heinrich.—Die Molukken. Geschichte und Quellenmässige Darstellung der Eroberung und Verwaltung der Ostindischen Gewürzinseln durch die Niederländer. Leipzig, Brockhaus. Price 12s. (*Williams & Norgate.*)

A section of the work is devoted to the geography of the Moluccas, while the work generally deals with the ancient political geography and history, and the annals of Dutch colonisation.

China.—No. 1, 1888. Report by Mr. F. S. A. Bourne of a Journey in South-western China. London, H.M.'s Stationery Office: folio, pp. 92. Price 4s. 6d.

According to instructions Mr. Bourne, H.M.'s Consular Agent at Ch'ing-Ch'ing, made a journey in 1885-6 through the south-western province of China, "to inquire into the commercial conditions and communications" of that little known region. He went through Yün-nan Fu to P'u-erh Fu, along the Tonquin border to Nan-ning Fu, in Kwang-si, and returned to Ch'ung-ch'ing through the provinces of Kwang-si and Kwei-chou. His report abounds with observations of great value, which it is impossible to analyse here. Some of his most important observations were lost, but by aid of his sketch maps and hundreds of barometric and thermometric observations, it will be possible to make important corrections in and additions to the geography of the extensive region traversed during a journey of over six months.

[**Dutch East Indies.**]—Handboek von Cultur-en Handelsondernemingen in Nederlandsch-Indië. Erste Jaargang. Amsterdam, Bussy, 1888: 8vo., pp. vii. and 467. Price 4.70 florins. [Presented by Messrs. Trübner & Co.]

This year-book gives much useful information on the culture and commerce of the Dutch East Indies. About 400 pages are occupied by an alphabetical list of the various plantations with their situations, their owners, communications, products, &c. This is followed by another list of the various commercial undertakings arranged according to products. Then there are lists of the principal commercial firms, of anonymous companies, and of persons referred to in the book.

Logan, William.—Malabar: Madras, The Government Press, 1887: 2 vols. 8vo.; vol. i. pp. x. and 760; vol. ii. (appendices), pp. cccvi. [Presented by the Secretary of State for India.]

This monumental work, the result of years of research, contains a complete account of Malabar in all its aspects. In successive chapters Mr. Logan deals with the district, its geography and geology, climate, fauna and flora; the people; history; the land. In the second volume there is a wealth of details of all kinds,—statistics, fauna and flora, linguistics, agricultural and industrial data, and descriptive notices of all the Taluks. The work is accompanied by a map on the scale of 4 miles to an inch.

Siam.—No. 2 (1888). Report by Mr. W. J. Archer of a Journey in the Vice-Consular district of Chiengmai, Siam. London, H.M.'s Stationery Office, 1888: folio, pp. 16.

Mr. Archer made the journey, some of the results of which he gives in this report, in February and March of 1887. The journey extended north from Chiengmai on the Me Ping to Muang Ngai, north-east to Chieng Sin on the Cambodia river, south and south-east to Nan on the Nam Nan, and west by Lakhon to Chiengmai. So far as topography is concerned, Mr. Archer does not add much

to what is already recorded on Mr. M'Carthy's recently published map. He gives some interesting details concerning the various peoples and the towns he visited. Speaking of the capital (a large village) of the province of Mûang Fâng, founded nine years ago, he says it is interesting to notice how these settlements are effected by the Laos, as it may illustrate the manner in which the present capitals of these States were founded within comparatively recent times. The site having been fixed upon, the laborious task of clearing the jungle is begun; all, or nearly all, the trees are felled, the roads are marked out, and alongside the settlers are allowed to choose a piece of ground. A rough shanty is generally put up at first, and round it are planted bananas and other quick-growing plants. The grounds of the old temples are not encroached upon, and the principal "wats" are often reoccupied by priests. Many of the new comers first reside in the capital, but as by degrees they have opportunities of becoming better acquainted with the surrounding country, they begin by cultivating the most promising land in the neighbourhood. Others join them, and thus villages are formed; and when a longer residence and increased population have given a footing of greater confidence and security, settlements are gradually formed further from the capital. A large body of immigrants, or a number of families from the same locality, generally form a separate settlement, especially if they are of different race from the original settlers; and if they settle in the capital, they usually have a separate quarter allotted to them. The town of Chiengmai, for instance, is divided into numerous quarters, inhabited almost exclusively by people of a different race. Many of the villages in the province are colonies of refugees or captives. Mr. Archer's further notes on the people, as well as on the resources of the region traversed, are of great interest.

[Taylor, G.].—A Ramble through Southern Formosa. [From the 'China Review.']
8vo., sketches. [Presented by the Author.]

AFRICA.

Abyssinia. No. 1 (1888). Correspondence respecting Mr. Portal's Mission to Abyssinia. [C.—5431.] London, Harrison and Sons: folio, pp. iv. and 31. Price 7d.

Africa. No. 1 (1888). Further Correspondence relating to Zanzibar. [In continuation of 'Africa, No. 3: 1887.'] [C.—5315.] London, Harrison and Sons: folio, pp. xi. and 135. Price 1s. 7d.

— No. 2 (1888). Papers relating to King Ja Ja of Opobo, and to the Opening of West African Markets to British Trade. [C.—5365.] London, Harrison and Sons: folio, pp. iv. and 101. Price 1s. 2d.

Balfour, Isaac Bayley. — Botany of Socotra. Forming vol. xxxi. of the Transactions of the Royal Society of Edinburgh. Edinburgh, R. Grant & Son; (Williams & Norgate) 1888: 4to., pp. lxxv. and 446, map and plates. [Presented by the Royal Society of Edinburgh.]

Contains an introductory chapter on the Geography and Geology of the island.

Banbury, G. A. Lethbridge.—Sierra Leone; or, The White Man's Grave. London, Swan Sonnenschein & Co., 1883: 8vo., pp. 296, illustrations. Price 10s. 6d. [Presented by the Publishers.]

This volume, consisting of a series of letters, describes an Englishman's life in the colony of Sierra Leone. Apart from the personal matter, there is much that is interesting regarding the country and people, including, among other things, an account of the Early History of the Settlement, Sierra Leone under the Crown, the Trade of the Colony, Annexations and Customs, &c. The volume on the whole gives a good general idea of life in the colony.

Baumgarten, [Dr.] Johannes.—Deutsch - Afrika, und seine Nachbarn im Schwarzen Erdteil. Eine Rundreise in abgerundeten Naturschilderungen, Sitten-

scenen, und ethnographische Charakterbilder. Nach den neuesten und besten Quellen, für Freunde der geographischen Wissenschaft und der Kolonialbestrebungen, sowie für den höheren Unterricht. Berlin, Dümmler, 1887: 8vo., pp. xv. and 507. Price 6 marks.

This is a useful and, we believe, trustworthy summary of our knowledge of certain regions of Africa, from the German colonial point of view. It includes not only German Africa, but nearly the whole of the continent, presenting sketches of the geography, the resources, and the people of the various regions.

Bechuanaland.—Further Correspondence respecting the Affairs of Bechuanaland and Adjacent Territories. (In continuation of [C.—5237] of September 1887.) [C.—5363.] London, Eyre and Spottiswoode, 1888: folio, pp. 45, map. Price 1s.

Coquilhat, Camille.—Sur le Haut-Congo. Paris, Lebègue et Cie., 1888: 8vo., pp. viii. and 533. Price 6s. 6d. (*Williams & Norgate.*)

Captain Coquilhat's name is one of the best known in connection with the Congo Free State after that of Mr. Stanley. He has been long connected with it, and his interesting volume is an important contribution to our knowledge of the river and of the work of the State. He puts it forth as supplementary to Stanley's own work; he has been able to observe details which were beyond the cognisance of his chief, whose business it was to attend to the general administration. The first part of the volume deals with the period from Captain Coquilhat's departure from Brussels to the foundation of the Equator Station. During this period he was constantly journeying up and down the river, and had thus ample opportunities of collecting information concerning the country and people on its banks. The second part of the narrative is occupied with the Captain's experiences among the Bangala of the station, among whom he had command. The information which he gives concerning these interesting people is varied and of original value. The third part of the volume gives a detailed narrative of the foundation of Stanley Falls Station, and of the disastrous results of the hostility of the Arabs. In the concluding section Captain Coquilhat discusses the future of the Congo in respect of commerce and civilisation. He expresses confidence in the progress of the Free State, but admits that this is largely dependent on an increased investment of capital. There are many illustrations, including portraits of natives, views of various kinds, and fishes of the Upper Congo, the last of which will interest naturalists. There are also several large-scale maps. The book is altogether an important contribution to the literature of the Congo.

Frey, [Colonel] H.—Campagne dans le Haut Sénégal et dans le Haut Niger (1885–1886). Paris, Plon, 1888: 8vo., pp. 503. Price 5s. 3d. (*Dulau.*)

The campaign described in this volume comprises in the first place the operations against the bands of the chief Samory, who were driven across the Niger, and a treaty of peace was concluded with the chief himself. The second period comprises the operations which had for their object the pacification of Guoye, Kamera, and Guidimaka provinces of the Upper Senegal, the inhabitants of which had risen *en masse* and had laid siege to the post of Bakel. The distance between the extreme points of the two theatres of operation, Bamakou and Dembakané, is 560 miles, and as this was covered by the troops in their march, the narrative contains considerable information on the topography of the region. There are three good maps, embodying the latest information.

Ibrahim-Hilmy [H.H. Prince].—The Literature of Egypt and the Soudan from the earliest times to the year 1885 inclusive. A Bibliography, comprising printed books, periodical writings, and papers of learned societies, maps and charts, ancient papyri, manuscripts, drawings, &c. With Appendix of additional works to May 1887. London, Trübner & Co., 1888: 2 vols. 4to., vol. ii. pp. 459, M–Z. Price 31s. 6d. [Presented by Prince Ibrahim-Hilmy.]

The first volume of this useful and comprehensive Bibliography was noticed in the 'Proceedings' for 1886, p. 276.

AMERICA.

Borsari, Ferd.—Una pagina di Storia Argentina. I. La conquista della Pampa. II. Un sessennio di Presidenza. Napoli, M. Gambella, 1888: 8vo., pp. 31. [Presented by the Author.]

Kingsford, William.—The History of Canada. London, Trübner & Co., 1888: vol. i. [1608–1682], 8vo., pp. xi. and 487. Price 12s. 6d.

The main object of this work is to trace the history of British rule in Canada since its conquest from the French, and to relate the series of events which have led to the present constitution under which the Dominion is governed. As a preliminary to this, the author deals with the events which occurred in Canada from the date of its discovery down to the end of the French domination. This first volume embraces the period from the first known voyages to La Salle's descent of the Mississippi.

Lista, Ramon.—Viaje al País de Los Onas, Tierra del Fuego. Buenos Aires, 1887: 8vo., pp. 145.

Signor Lista in 1886–7 made a journey of exploration along the east coast of Tierra del Fuego, with an occasional excursion into the interior. This volume contains a narrative of the expedition, which added considerably to our knowledge of the country, in a series of official letters.

ARCTIC.

Nordenskiöld, A.-E.—La Seconde Expédition Suédoise au Grönland (L'Inlande et la Côte Orientale), entreprise aux frais de M. Oscar Dickson. Traduite du Suédois avec l'autorisation de l'auteur, par Charles Rabot. Paris, Hachette et Cie., 1888. Price 12s. 6d. (*Williams & Norgate.*)

It will be remembered that in 1883 Baron Nordenskiöld led an expedition to Greenland, the object of which was, if possible, to cross that icebound land from west to east, a feat which had been unsuccessfully attempted before on more than one occasion. He took the *Sofia* through the fjord to the south of Tasitsarsook Peninsula, and landed with his party at what he named Sofia Harbour. After leaving the coast the ice was found very irregular and hillocky, broken up by crevasses, with numerous streams, some of them visible, some of them underground. After proceeding inland about 80 miles, the main party camped, and the two Lapps went on alone on snow-shoes for about 130 miles further, the highest altitude attained being about 6500 feet. The detailed account of the observations along the ice, the so-called cosmic dust, kryokenite, the peculiar character of the ice, and other points, are of much scientific interest. But Baron Nordenskiöld's volume contains much more than a narrative of the journey. He investigated the remains of the old Norse settlements in the south of Greenland, and carried out a series of researches in the ocean off the south-east coast, a full account of which appeared in the 'Proceedings' for 1884, p. 569, by Axel Hamburg. Upernivik was visited, and much of the volume is devoted to observations on the various parts of the coast touched at, to a historical account of European relations with Greenland, and of the manners and customs of the Eskimo. There are many beautiful illustrations and four maps.

AUSTRALASIA.

[**Australasia.**—Transactions and Proceedings of the Royal Geographical Society of Australasia (Victoria Branch). Edited under the authority of the Council of the Society by A. C. Macdonald, M.G.S. Part I, vol. v., issued March 1888. Melbourne, 1888.

In this part of the Victoria 'Transactions' is a paper by Mr. Edwin Merrill on "An Unknown Part of Victoria," dealing with the county of Croajingolong, lying between the coast, the Guy river, and the N.S.W. boundary, giving the results of a recent exploration of the district. The Rev. John Bulmer contributes a paper on the aborigines of the Lower Murray, Wimmera, and Maneroo. There

are also some notes, with a chart, by Mr. Douglas, H.M.'s Special High Commissioner in New Guinea, on a recent visit which he made to the Louisiade Archipelago.

Hayter, Henry Heylyn.—Victorian Year-book for 1886–7. (Fourteenth Year of Issue.) Melbourne, 1887: 8vo., pp. iv. and 931, map and tables. [Presented by the Government Statist of Victoria.]

The population of Victoria at the end of 1886 was estimated at 1,003,043 persons.

Newland, S.—The Far North Country. Reprinted from the 'South Australian Advertiser.' Adelaide, 1887: 8vo., pp. 39. [Presented by the Agent-General for South Australia.]

Mr. Newland was a member of the South Australian Trans-Continental Railway Commission. In the pamphlet he gives in a sketchy way the results of his observations between the Peake Station and the Macdonnell range. He seems an impartial observer, and while admitting that much of the country is hopeless enough, he shows that there are large areas quite capable of being put to pastoral uses. He tells us that the success in sinking wells along the telegraph line has been already considerable, and with better methods and more determination might be much greater; so great that a fair system of irrigation might be established in many places. Some idea of the economical value of the country dealt with by Mr. Newland may be obtained from the following estimate which he gives of what he calls its carrying power:—From the Peake Station to Cecilia Creek it will bear about 20 sheep to the mile; Cecilia to Charlotte Waters, 30 to 50; Charlotte Waters to Macdonnell Range and Bert's Creek, 70 to 100.

Russell, Henry Stuart.—The Genesis of Queensland; An account of the great exploring journeys to and over the Darling Downs; the earliest days of their occupation; social life; station seeking; the course of discovery northward and westward; and a résumé of the causes which led to separation from New South Wales, with portraits and facsimiles of maps, log, &c., &c. Sydney, Turner and Henderson, 1888: 8vo., pp. xvi. and 633. Price 21s.

The title-page describes very fully the nature of the contents of the volume. Its geographical value consists in the connected account which it gives of the exploration of Queensland.

GENERAL.

Bonenschen, [Dr.] A.—Untersuchungen über Johann de Mandeville und die Quellen seiner Reisebeschreibung. 'Zeitschrift der Gesellschaft für Erdkunde zu Berlin,' Nos. 135, 136, 1888.

Brough, Bennett Hooper.—Tacheometry, or Rapid Surveying. London, 1887: 8vo., pp. 20.

[The 'Challenger' Voyage.]—Report on the Scientific Results of the Voyage of H.M.S. Challenger during the years 1873–76, under the Command of Capt. George S. Nares, R.N., F.R.S., and the late Capt. Frank Tourle Thomson, R.N. Prepared under the superintendence of the late Sir C. Wyville Thomson, Knt., F.R.S., &c., and now of John Murray, one of the Naturalists of the Expedition. Zoology—Vols. XXIII., XXIV. (text, and plates), and XXV. London, Eyre and Spottiswoode, 1888: 4to., pp. (Vol. XXIII.) viii., 132, 97, lxix., 90, 18, and 51; (Vol. XXIV.) xc. and 942; (Vol. XXV.) clxvi. and 458; charts and plates. Price (Vol. XXIII.) 40s.; (Vol. XXIV., including volume of plates) 90s.; (Vol. XXV.) 42s. [Presented by the Lords Commissioners of Her Majesty's Treasury.]

Chisholm, George G.—Longmans' School Geography for Australasia. London, Longmans & Co., 1888, 8vo., pp. 320. Price 3s. 6d. [Presented by the Publisher.]

Mr. Chisholm's School Geography was a great improvement on anything previously published in this country, both in method and in the class of facts

included. His enterprise in bringing out the edition for Australasia will no doubt meet with the encouragement it deserves. He has, with much wisdom, obtained the approval of a considerable number of head masters in Australia of the portion relating to that continent; might it not also have been well to submit the pages to a few of those who from personal knowledge or special study are most familiar with Australian geography—for example the leading men of the various colonies? However, they might not have been able to improve what after all is only a sketch, and which seems to us to be of a higher scientific quality than the portions devoted to the rest of the world. Mr. Chisholm shows very instructively the character of the climate of Australia, and the action of that on physical conditions, with the resulting economical results. It seems to us, however, that he pushes the analogy between Australia and Africa too far, especially with reference to their respective mountain systems. The illustrations are not always the most instructive or typical, and some of them appear much worn, e. g. Arctic icebergs on p. 54; surely something better than this was procurable.

Daubrée, A.—*Les Eaux Souterraines à l'époque actuelle, leur Régime, leur Température, leur Composition, au point de vue du Rôle qui leur revient dans l'Économie de l'Écorce Terrestre.* Paris: Dunod, 1887. 2 vols. 8vo., vol. i. pp. iii. and 455; vol. ii. pp. 302.

— *Les Eaux Souterraines aux Époques Anciennes; Rôle qui leur revient dans l'Origine et les Modifications de la Substance de l'Écorce Terrestre.* Same publisher: 8vo., pp. iv. and 443. [Presented by the Author.]

These three volumes by the eminent French geologist, contain much that will prove useful and suggestive to the student of physical geography. This is especially the case with the two volumes dealing with underground waters at the present day. The vast array of facts, combined with maps and sections, render the work extremely valuable as a book of reference, and M. Daubrée does not indulge very largely in theory. The first book of the former of the two works treats of the régime of underground waters. The first two chapters deal mainly with the phenomena observed in permeable rocks. The next chapter discusses, with a wealth of examples, the results of the mutual contact of permeable and impermeable rocks. Chapter iv. (160 pages), treats of the functions of joints, faults, and fractures of various kinds, while the following chapter deals with the very important subject of caverns. In the next two chapters the subject of water acted on (1) by compressed gases, and (2) by the expansive force of their own vapour, is discussed. The second book of the work is devoted to a consideration of the temperature of subterranean waters under the headings of ordinary springs and hot springs. Book third deals with the composition of underground waters, and is, of course, largely chemical. In the fourth book we have general observations and a résumé of the whole, the concluding part dealing with geysers, volcanoes, and earthquakes.

The second work, which treats of the work of underground waters in past epochs, is more strictly geological and mineralogical than the former. It deals with (1) The formation of zeolites and related minerals; (2) Metalliferous veins and travertines; (3) Changes which have taken place in rocks since their formation; (4) Function of underground waters in the origin of the substances constituting stratified rocks. The concluding section discusses briefly the light reciprocally shed on each other by the past and the present.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Edinburgh.—Waistcoat Pocket Map of the County of —. Scale 1:250,000 or 3·4 geographical miles to an inch. W. & A. K. Johnston, Edinburgh and London, 1888. Price 3*d*.

This little map is folded so as to be carried in the waistcoat pocket; all roads and railways are laid down, and an index of parishes is given.

—, **Leith, and Portobello.**—New Plan of —. Constructed from the latest surveys, with additions by the local surveyors of these towns. Scale 1:10,560 or 6·9 inches to a geographical mile. W. & A. K. Johnston, Edinburgh and London, 1888. Price 1*s*.

This is a very clearly drawn map, which folds into a convenient size for the pocket, and will no doubt be useful to visitors to Edinburgh. An index is given, by which any place on the map can be easily found.

Latium.—Wall Map of Ancient —. 4 sheets. Scale 1:125,000 or 1·7 geographical miles to an inch. With the environs of Rome. Scale 1:25,000 or 2·9 inches to a geographical mile. H. Kiepert. Berlin, Dietrich Reimer, 1888. Price 9*s*. (*Dulau*.)

This map is intended to supersede a wall map by the same author which was published forty years ago at Weimar, and which was, as Dr. Kiepert informs us, compiled originally from defective material, and has never been touched by him since, but is still sold, without a date, for the use of schools, to illustrate the ancient history of Rome. As the author has been unable by legal means to combat this misuse of his name and reputation, he has now published a completely new map, in which he has made use of all the latest geographical materials to be obtained. Owing to the diligence of the Italian General Staff, trustworthy maps have been published, containing correct measurements of the country delineated in the map under consideration.

The colouring of this map has been chosen so that when viewed from a short distance the alluvial depressions may appear plainly by the side of the level surface of the Campagna. The present names of places have been inserted in light type underneath the ancient ones, and all roads, aqueducts, &c., are laid down. The map is well drawn, and the hill-shading very effective.

Pyrénées occidentales.—Carte de front des —, à l'échelle de 1:320,000 or 4·4 geographical miles to an inch. Zone orientale par Rollet. Paris. (*Dulau*.)

Württemberg, Baden, und Hohenzollern.—Karte von —, nach den neuesten Materialien bearbeitet von L. Rachel. Scale 1:450,000 or 6·2 geographical miles to an inch. Stuttgart, Albert Müller. Price 1*s*. (*Dulau*.)

ORDNANCE SURVEY MAPS.

Publications issued during the month of June 1888.

1-inch—General Maps:—

ENGLAND AND WALES: New Series. Sheets 113, 137, 203, 246, 322, 351 (in outline). 1*s*. each.

6-inch—County Maps:—

ENGLAND AND WALES: Anglesey: 5 S.E., 7 N.E., 11 N.E., 13 N.W., N.E., S.W., 17 N.E., 18 N.W., S.E., 19 N.W.; 1*s*. each. Brecknockshire: 6 N.W., N.E., S.W., S.E., 11 S.W., S.E., 12 S.W., 15 N.E., 16 N.W., S.W., S.E., 43 N.W.; 1*s*. each. Cardiganshire: 13 S.E., 13 S.W., 17 N.E., S.E., 28 N.W., N.E., S.E., 35 S.W.; 1*s*. each. Carmarthenshire: 2 S.W., 50 N.W.; 1*s*. each. Cornwall: 13A S.E. and 18 N.E. on one sheet, 24 N.W., 33 S.W., 42 N.W., 51 S.W., 66 S.E., 68 N.E., 69 N.W., 63 N.E., containing Redruth, 64 S.W., 65 N.E., S.W., 70 S.E., 72 N.W., containing St. Just, 75 S.W., 77 N.E., S.W.; 1*s*. each. Devonshire: 8 N.E., S.E., 9 N.E., 31 S.E., 42 N.E., S.E.; 1*s*. each. Dorsetshire: 46 N.W., 49 N.E., S.E., 60 N.E., S.E., 66 N.W., S.E.; 1*s*. each. Herefordshire: 19 N.E.; 1*s*. Lincolnshire: 40 N.W., S.W., S.E., 75 N.W., 105 S.W.,

114 N.W., N.E., 115 N.W., N.E.; 1s. each. **Merionethshire**: 20 N.W., N.E., S.W., 27 N.W., S.W., S.E., 32 S.E., 33 N.W., 36 S.W., 41 S.E.; 1s. each. **Pembrokeshire**: 14 N.W. and N.E. on one sheet, 14 S.W., 15 N.W., N.E., 20 N.W., 21 N.W., 22 N.W., 27 N.W., 28 N.E.; 1s. each. **Radnorshire**: 6 S.E., 7 S.W., 13 N.E., S.E., 24 N.W., N.E., S.W., S.E., 25 N.E., 32 S.W., 33 S.W., 35 S.E.; 1s. each. **Somersetshire**: 77 N.E.; 1s. **Staffordshire**: 13 S.W.; 1s. **Wiltshire**: 9, 22; 2s. 6d. each.

25-inch—Parish Maps:—

ENGLAND AND WALES: Brecknockshire: XIV. 10, 14, XIX. 12, XX. 1, XXXIII. 11, 14, XLII. 6, 3s. each. **Cambridgeshire**: VII. 10, 4s.; XXIX. 12, 3s.; XXXIII. 2, 4s.; XXXIV. 11, 12, 3s. each; XL. 15, 5s.; XLIV. 12, XLVII. 1, LVII. 10, 3s. each; LVII. 14, 4s.; LXII. 7, 3s. **Cardiganshire**: VII. 9, 10, 3s. each. **Carmerthenshire**: XVII. 11, XVIII. 11, 12, 14, XIX. 1, XL. 7, 11, XLI. 7, 3s. each. **Devonshire**: XII. 11, 5s.; XX. 11, XXI. 14, LXV. 4, 6, 3s. each; CXXVII. 1, 4s. **Dorsetshire**: VIII. 12, IX. 4, 8, 9, 13, X. 5, 10, 14, XI. 3, XVI. 10, XXIV. 1, 2, 3, 4, 11, 12, 3s. each; XXIV. 16, 4s.; XXV. 3, 16, XXVI. 5, 10, XXXIII. 5, 11, 14, 16, XXXIV. 13, 3s. each. **Gloucestershire**: Area Books: City and County of the City of Bristol, 2s. 6d.; St. George, 1s. 6d.; Westbury on Trym, 1s. 6d. **Herefordshire**: XXXIX. 16, XL. 9, 14, XLI. 1, 6, 3s. each. **Huntingdonshire**: XVII. 1, 10, 16, XXI. 5, XXII. 7, 11, 3s. each; XXXII. 2, 4s.; XXV. 1, XXVII. 4, 12, 3s. each. **Leicestershire**: XXXIV. 12, 3s.; XXXVI. 16, 4s. **Lincolnshire**: VIII. 6, XXX. 3, 8, 12, 14, 15, XXXIX. 1, 5, 11, LV. 14, LXXIV. 8, 3s. each; LXXXIX. 8, 4s.; LXXXVII. 7, 13, 3s. each; CXXXVI. 5, 4s.; CXXXVI. 11, CXXXVIII. 4, 3s. each; CXXXVIII. 8, CXXXIX. 1, 2, 5, CXL. 1, 3s. each; CXL. 2, 4s.; CXL. 3, 13, 3s. each; CXL. 14, CXLII. 10, 4s. each. **Norfolk**: Area Books: Alington, Brooke, Burlingham, St. Edmund, Cantley, Carleton St. Peter, Croxton, Great and Little Snareshill, Hardley, Hockwold cum Wilton, Kilverstone, Langley (Do. Det.), 1s. each. **Northamptonshire**: XXXIX. 7, 8s. **Somersetshire**: IX. 11, 3s.; LX. 15, 16, 6s. 6d. each; XXXVI. 9, 10, 3s. each; XXXVI. 12, 4s.; XLI. 1, 3s.; XLI. 5, 6s.; XLVIII. 1, 4s.; XLVIII. 5, XLIX. 8, 3s. each; LXXXVII. 5, 4s. **Warwickshire**: V. 16, 3s.; IX. 14, XIV. 12, 4s. each; XV. 2, 5s.; XVI. 7, 3s.; XVII. 6, 4s.; XVII. 15, 3s.; XIX. 11, 4s.; XIX. 12, 5s.; XXIV. 7, 4s.; XXVI. 10, 5s.; XXXIII. 1, 3s.; XXXIII. 2, 4s.; XXXIII. 6, LIV. 13, 14, 3s. each. **Wiltshire**: XXXVIII. 7, 6s. 6d.; LXIII. 10, 14, 15, LXVIII. 8, 3s. **Worcestershire**: VI. 12, 4s.; XXXIII. 3, 6s. 6d.; LII. 13, 3s.

Town Plans—10-foot scale:—

ENGLAND AND WALES: Atherstone, VI. 11, 22; 2s. 5d. Brecon (Aberhonddu), XXVII. 16, 5; XXVIII. 13, 1; 2s. each. Cambridge, XLVII. 2, 11, 16, 21, 25; XLVII. 3, 11; XLVII. 6, 1, 3; 4s. each. XL. 14, 21; XLVII. 3, 1; XLVII. 6, 9; 5s. each. Dartmouth, CXXVII. 16, 15; 2s. Horn-castle, LXXIII. 15, 1; 2s.

(Stanford, Agent.)

ASIA.

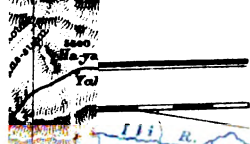
Asia Minor.—Wall Map of Ancient —. 6 sheets. Scale 1:800,000 or 11 geographical miles to an inch. H. Kiepert. Berlin, Dietrich Reimer, 1888. Price 9s. (Dulau.)

In this map the coast-lines of the Mediterranean and Aegean Seas, and that of the Sea of Marmora, have been taken from the British Admiralty charts, those of the Russian naval surveys being used for the Black Sea. Dr. Kiepert states that he has met with considerable difficulty in procuring material for the compilation of this map, and in the accompanying letterpress complains that information which would be of great value is kept secret by the British and Russian Governments, and that all applications to look at or use these maps, although supported by the highest authorities, have been refused. Notwithstanding these difficulties, however, Dr. Kiepert has succeeded in producing an excellent map.

AFRICA.

Afrique.—La Carte d'—. Scale 1:2,000,000 or 27 geographical miles to an inch. Sheets:—No. 2, Tunis; No. 5, Laghouat; No. 6, Tripoli; No. 12, Mourzouk; No. 26, Kouka; No. 27, El Fâcher. Dressé et dessiné par le Chef de Bon du Génie Régnauld de Lannoy de Bissy. Publié par le Service Géographique de l'Armée en 1887. Étant Directeur du Service Géographique le Général Perrier, 1887. Price 6d. each sheet. (Dulau.)

Speaking generally, these sheets contain a larger number of routes, and a greater amount of detail than is to be found in other maps of the same districts. On Sheet 2 an inset map of Tunis is given on an enlarged scale; on Sheet 5 the Cha'amba bou Rouba is shown as extending farther to east than the limits usually assigned to it, and additional routes across the El Areg are laid down; Sheet 6 shows many fresh routes and watercourses, with plans of Ghadames and Tripoli; on Sheet 12 Rhat has been moved a little to the east, and a large amount of detail given; the most noticeable feature on Sheet 26 is the change that has been made in the shape of Lake Tchad, and the absence of islands



2

To

Asi
g
(

1
t
c

Afriq
She
No.
Gén
l'Ar
188

g
O
th
us
St
an
an
th

72

74

76

78

CENTRAL ASIA

From

PEKING TO YARKAND

and

KASHMIR VIA THE MUSTAGH PASS

illustrating the journeys of

Lieut. F.E. Younghusband, Kings Dragoon Guards

Scale

50 9 50 100 150

One inch = 88 Miles





along its western shore; on Sheet 27, routes, rivers, and watercourses have been laid down, which are not shown on the most recent maps of the same part of Africa.

Sankuru-Stromes.—Originalkarte des — und seiner Nebenflüsse. Nach den Aufnahmen von Dr. Ludwig Wolf im Dampfer des Kongo-Freistaates "En Avant" 1886, konstruiert, und mit den Aufnahmen der Wissmann'schen Expeditionen von 1881-1885 zusammengestellt von Dr. Bruno Hassenstein. Scale 1:600,000 or 8·2 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1888, Tafel 12. Justus Perthes, Gotha. (*Dulau.*)

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in May and June 1888.

No.		Inches.	
13	m =	6·0	England, south coast:—Littlehampton, 1s. 6d.
2565	m =	0·5	England, south coast:—Trevose head to Dodman point, including the Scilly isles, 2s. 6d.
2682	{ m =	1·0	England, west coast, Bristol channel:—North point to New Passage. Approach to Barry roads. River Usk, 2s. 6d.
	{ m =	2·7	
	{ m =	4·5	
1165	m =	4·0	Wales, south coast:—Tenby and Caldy roads, 2s.
1630	m =	0·5	England, east coast:—Orfordness to Blakeney, with the off-lying shoals between Smith's knoll and the Outer Dowsing, 2s. 6d.
1121	m =	11·5	Norway, west coast:—Bergen, 1s. 6d.
1195	m =	14·5	Spain, east coast:—Port of Barcelona, 1s. 6d.
1174	m =	0·65	Africa, west coast:—Bonny, New Calabar, and Sombreiro rivers, 1s. 6d.
1109	m =	various.	Red Sea:—Harbours and anchorages—Eeles cove. Sherm Abu Amara Farat. Mahommed Ghoul. Dolphin cove, 1s.
1035	m =	2·3	India, west coast:—Perim island to Bhaunagar, 2s. 6d.
2031	m =	0·25	Ceylon, east coast:—From 7° 20' N. to point Pedro. (Plan, Batticaloa roads), 2s. 6d.
1075	m =	0·97	Bay of Bengal:—Approaches to Mergui harbour, 2s. 6d.
1117	m =	various.	Russian Tartary:—Trinity bay, Sedimi bay, Abrek bay, Djiget bay, Alexandrovski and Dui roadsteads, 2s.
348	m =	0·25	Australia, east coast:—Whitsunday island to Magnetic island, 3s.
1088	m =	1·5	New Guinea, south-east coast:—China strait and approaches. Anchorage off Samarai or Dinner island, 2s. 6d.
1175	m =	various.	South Pacific ocean:—Sketches of anchorages in the Paumotu or Low Archipelago, 1s. 6d.
991	.. ..	.. ..	Anchorages on the coast of Yezo:—New plan, Nemoro anchorage.
979	.. ..	.. ..	Islands between 150° and 170° W.:—Plan added, West passage anchorage (Penrhyn I.)

(*J. D. Potter, Agent.*)

CHARTS CANCELLED.

No.	Cancelled by	No.
13 Arun river and town of Littlehampton	New plan, Littlehampton	13
2565 Trevoise head to Dodman point..	New chart, Trevoise head to Dodman point	2565
2682 Nash point to New Passage ..	New plan, Nash point to New Passage	2682
1165 Tenby and Caldy roads	New plan, Tenby and Caldy roads	1165
1630 Orfordness to Cromer	New chart, Orfordness to Blakeney	1630
1195 Port of Barcelona	New plan, Port of Barcelona	1195
2031 Caratievoe to Pedro point	New chart, From 7° 20' N. to point Pedro	2031
348 Whitsunday isles to Magnetic island	New chart, Whitsunday island to Magnetic island.. .. .	348
1577 Columbia river.		
2405 Plan of Jonquière bay on this chart.		

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 120. North sea:—Schelde river. 1522. Mediterranean, Asia Minor:—Smyrna harbour. 863. North America, Labrador:—Hudson bay and strait. 2522. South America, east coast:—Santa Catharina island to Rio de la Plata. 2002. South America, east coast:—Rio Grande do Sul. 2337. North America, west coast:—Sitka sound. 759. Madagascar:—Cape St. Andrew to cape St. Vincent, and Antongil bay to Matatane. 2761. Sumatra, west coast:—Tyingkokh bay to Sunda strait. 961. Sulu archipelago:—Basilan channel. 1199. China, east coast:—Kweshan islands to the Yang-tse-kiang. 1602. China, east coast:—Entrance to the Yang-tse-kiang. 2350. Australia, north-east coast:—Double point to cape Tribulation.

(*J. D. Potter, Agent.*)

United States Charts.—No. 1087. Estanques Bay, Venezuela. 1888. Price 1s. 1d. —Pilot Charts of the North Atlantic for June and July 1888. Published at the Hydrographic Office, Navy Department, Washington, D.C. Commander J. R. Bartlett, U.S.N., Hydrographer to the Bureau of Navigation.

ATLASES.

Argentine Republic.—Atlas de la República Argentina, publicado por el "Instituto Geográfico Argentino." Comisión Especial del Mapa y Atlas de la República. Tercera Entrega. Buenos Aires, Lito-Tipografía de J. Ruland, 1888. (*Dulau.*)

This is the third issue of the atlas, and contains the following maps:—Sheet XIV., the province of San Luis; Sheet XX., the provinces of Salta and Jujuy; Sheet XXI., the governments of the Chaco and Formosa; Sheet XXII., the government of the Pampa; and Sheet XXIV., the government of Rio Negro. From the above it will be seen that the maps are not published in consecutive order, but as soon as completed in sufficient numbers to make up a *livraison*. The maps are very nicely drawn; the hill-shading in Sheets XX. and XXIV. being very effective, and the heights are given in metres. There is nothing to show on what authority the maps are based, which is to be regretted, as several of the sheets contain a great deal of new work. The maps have been entirely produced at Buenos Ayres, and are very creditable specimens. When completed, the atlas will be a most important addition to the cartography of South America.

ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by Colonel H. H. GODWIN-AUSTEN, F.R.S., J. K. LAUGHTON, M.A., and DOUGLAS W. FRESHFIELD, M.A. Contents: Hints on Surveying and Astronomical Observations. John Coles, F.R.A.S.—Meteorology. R. Strachan, F.M.S.—Geology. W. T. Blanford, F.R.S.—Natural History. H. W. Bates, F.R.S., Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.—Anthropology. E. B. Tylor, D.C.L., F.R.S.—Photography. W. F. Donkin, M.A.—Medical Hints. J. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department.—General Outfit. Colonel J. A. Grant, C.B., Edward Whymper, and others. Price, in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, W.; and to be had of Edward Stanford, 55, Charing Cross, S.W.

Instruction for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. Surveying and Mapping, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. Geology, including practical training in the field. By Mr. W. Topley, F.R.S., of the Geological Survey. 3. Botany. By Mr. N. E. Brown, of the Herbarium, Kew. 4. Photography. By Mr. John Thomson, Author of 'Photographic Illustrations of China and its People,' and other works.

The lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2s. 6d.

Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers, Vol. II. Part 2.—Now Ready.—CONTENTS:—A Bibliography of Algeria. By Lieut.-Colonel Sir ROBERT LAMBERT PLAYFAIR, K.C.S.I. H.M. Consul-General, Algiers.

** Fellows who have not applied for the Parts as published, can have Vol. I complete by applying at the offices of the Society, 1 Savile Row, W.

LIMMER'S HOTEL,

CONDUIT STREET, W.

This old-established Hotel, situated in the centre of the most fashionable part of London—being mid-way between Bond Street and Regent Street—contains every convenience for the accommodation of FAMILIES and Gentlemen.

The Banqueting Hall is specially adapted for Military and other Dinners, and Wedding Breakfasts.

Address—THE PROPRIETOR.

DR. J. COLLIS BROWNE'S CHLORODYNE



IS
THE GREAT
SPECIFIC
FOR
CHOLERA,

COUGHS,
C C COLDS,
A STHMA,
B BRONCHITIS.

DR. J. COLLIS BROWNE'S CHLORODYNE.—Dr. J. C. BROWNE (late Army Medical Staff) DISCOVERED A REMEDY to denote which he coined the word CHLORODYNE. Dr. Browne is the SOLE INVENTOR, and, as the composition of Chlorodyne cannot possibly be discovered by Analysis (organic substances defying elimination), and since the formula has never been published, it is evident that any statement to the effect that a compound is identical with Dr. Browne's Chlorodyne must be false.

This Caution is necessary, as many persons deceive purchasers by false representations.

DR. J. COLLIS BROWNE'S CHLORODYNE.—Vice Chancellor Sir W. PAGE WOOD stated publicly in Court that Dr. J. COLLIS BROWNE was UNDOUBTEDLY the INVENTOR of CHLORODYNE, that the whole story of the defendant Freeman was deliberately untrue, and he regretted to say it had been sworn to.—See *The Times*, July 13th, 1884.

DIARRHOEA, DYSENTERY.
GENERAL BOARD OF HEALTH,
London, REPORT that it ACTS as a CHARM, one dose generally sufficient.
Dr. GIBBON, Army Medical Staff, Calcutta, states: "2 DOSES COMPLETELY CURED ME OF DIARRHOEA."

From SYMES & CO., Pharmaceutical Chemists, Simla. Jan. 5, 1880.

To J. T. DAVENPORT, London.

DEAR SIR,—We congratulate you upon the widespread reputation this justly-esteemed medicine has earned for itself all over the East. As a remedy of general utility, we much question whether a better is imported, and we shall be glad to hear of its finding a place in every Anglo-Indian home. The other brands, we are happy to say, are now relegated to the native bazaars, and, judging from their sale, we fancy their sojourn there will be but evanescent. We could multiply instances *ad infinitum* of the extraordinary efficacy of DR. COLLIS BROWNE'S CHLORODYNE in Diarrhoea and Dysentery, Spasms, Cramps, Neuralgia, the Vomiting of Pregnancy, and as a general sedative, that have occurred under our personal observation during many years. In Choleraic Diarrhoea, and even in the more terrible forms of Cholera itself, we have witnessed its surprisingly controlling power.

We have never used any other form of this medicine than Collis Browne's, from a firm conviction that it is decidedly the best, and also from a sense of duty we owe to the profession and the public, as we are of opinion that the substitution of any other than Collis Browne's is a deliberate breach of faith on the part of the chemist to prescriber and patient alike.—We are, Sir, faithfully yours, SYMES & CO., Members of the Pharm. Society of Great Britain, His Excellency the Viceroy's Chemists.

DR. J. COLLIS BROWNE'S CHLORODYNE is the TRUE PALLIATIVE in NEURALGIA, GOUT, CANCER, TOOTHACHE, RHEUMATISM.

DR. J. COLLIS BROWNE'S CHLORODYNE is a liquid medicine which assuages PAIN of EVERY KIND, affords a calm, refreshing sleep WITHOUT HEADACHE, and INVIGORATES the nervous system when exhausted.

DR. J. COLLIS BROWNE'S CHLORODYNE rapidly cuts short all attacks of EPILEPSY, SPASMS, COLIC, PALPITATION, HYSTERIA.

IMPORTANT CAUTION.
The IMMENSE SALE of this REMEDY has given rise to many UNSCRUPULOUS IMITATIONS. Be careful to observe Trade Mark. Of all Chemists. 1s. 1ld., 2s. 6d., and 4s. 6d. SOLE MANUFACTURER, J. T. DAVENPORT, 33, Gt. Russell St., W.C.

SEP 17 1888

VOL. X., No. 9.
New Monthly Series.]

SEPTEMBER, 1888.

[To Non-Fellows,
PRICE 1s. 6d.

PROCEEDINGS

OF THE

Royal Geographical Society

AND

Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE		PAGE
HUDSON'S BAY AND HUDSON'S STRAIT AS A NAVIGABLE CHANNEL. By Com- modore A. H. MARKHAM, R.N.	549	ON THE LENGTH OF THE PERSIAN FARSAKH. By General A. HOUTUM- SCHINDLER, Persian Telegraph Service	584
THE EXPLORATION AND SURVEY OF THE LITTLE ANDAMANS. By MAURICE PORT- MAN, Esq.	567	GEOGRAPHICAL NOTES	588
THE HYDROGRAPHY OF SOUTH-EASTERN TIBET. By Gen. J. T. WALKER, C.B., &c.	577	CORRESPONDENCE	594
		PROCEEDINGS OF FOREIGN SOCIETIES	595
		NEW GEOGRAPHICAL PUBLICATIONS	603
		NEW MAPS	611

MAPS.

CENTRAL ASIA, ILLUSTRATING THE JOURNEYS OF LIEUT. YOUNGHUSBAND	to face p. 548
THE COUNTRY BETWEEN YARKAND RIVER AND THE MUSTAGH RANGE	548
HUDSON'S BAY	612
ANDAMAN ISLANDS	612
HYDROGRAPHY OF SOUTH-EASTERN TIBET (4 Maps)	612

LONDON: EDWARD STANFORD, 55, CHARING CROSS, S.W.

PARIS: ANDRÉAU-GOUJON.

VIENNA: ARTARIA & Co.

HAMBURG: L. FRIDRICHSEN & Co.

ST. PETERSBURG: WATKINS & Co.

MANCHESTER: JOHN HEYWOOD.

EDINBURGH: DOUGLAS & FOULIS.

DUBLIN: HODGES, FOSTER & Co.

BERLIN: D. REIMER.

LEIPZIG: F. A. BROCKHAUS.

NEW YORK: SCRIBNER & WELFORD.

PHILADELPHIA: LIPPINCOTT & Co.

MELBOURNE: GEORGE ROBERTSON & Co., LIMITED.

Digitized by Google

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR	"
KURRACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

SUMMER TOURS IN SCOTLAND. GLASGOW and the HIGHLANDS.

(Royal Route via Crinan and Caledonian Canals.)

Tourists' Special Cabin Tickets issued during the Season, valid for six separate or consecutive days' sailing by any of Mr. Macbrayne's Steamers, £3.

THE ROYAL



MAIL STEAMERS

Columba, Chevalier, Mountaineer, Glencoe, Clydesdale, Lochiel, Handa, Mabel, Gladiator,
Iona, Grenadier, Pioneer, Claymore, Lochawe, Inveraray Castle, Islay, Lochness, Udea,
Fusilier, Gondolier, Glengarry, Clansman, Linnet, Cavalier, Fingal, Ethel.
Sail during the season for Kyles of Bute, Ardishaig, Oban, Ballachulish (for Glencoe), Fort-William, Banavie, Inverness, Staffa,
Iona, Lochawe, Islay, Tobermory, Portree, Strone Ferry, Gairloch, Lochmearce, Ullapool, Lochinver, Lochinaddy, Tarbert
(Harris), Stornoway, Thurso, Loch Katrine, Loch Lomond, the Trossachs, &c.; affording Tourists an opportunity of visiting
the magnificent scenery of Glencoe, the Cuchullin Hills, Quirang, Loch Coruisk, Loch Scavaig, Lochmearce, the Falls of Foyers,
and the famed Islands of Staffa and Iona. OFFICIAL GUIDE, 3d.; Illustrated, 6d.; Cloth Gilt, 1s. Time Bill, with Map and
Fares, Free by Post from the owner,
DAVID MACBRAYNE, 119, HOPE STREET, GLASGOW.

TEETH LIKE PEARLS

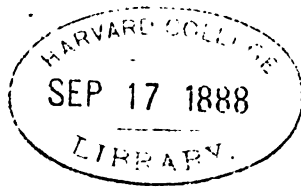
Produced by discarding cheap and gritty tooth powders and acid washes,
which ruin the enamel, and by using daily



ROWLANDS' ODONTO

A pure, fragrant, and non-gritty Tooth Powder; it whitens the teeth,
prevents decay, and gives a pleasing fragrance to the breath.

Avoid imitations and ask Chemists for ROWLANDS' ODONTO.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Hudson's Bay and Hudson's Strait as a Navigable Channel.

By Commodore A. H. MARKHAM, R.N.

(Read at the Evening Meeting, June 11th, 1888.)

Map, p. 612.

THE question of the practicability of navigating Hudson's Strait in safety during a certain period of the year has lately excited much interest on both sides of the Atlantic, for reasons apart from geography. At the same time it is a question which is of considerable geographical interest, in connection with the movements of the ice in that region. The knowledge I have acquired of that part of the world is due to a careful study of the writings of our old navigators, and also of more recent reports, and this has been supplemented by the experience I gained during a voyage on board the *Alert*, through Hudson's Strait to York Factory, on the western shore of Hudson's Bay, in the summer of 1886.

I have thought that a paper containing a condensed narrative of former voyages from the time of Sebastian Cabot, and an account of my own observations, would be useful to the Fellows of this Society for reference, if published in our 'Proceedings.' I therefore prepared a monograph of this kind, which has been accepted by the Council for printing, but which would be too long for reading at one of our Evening Meetings. What I now propose to submit to the meeting is a condensed version of parts of the historical section of my paper, followed by a fuller narrative of my own experiences.

Hudson's Bay, or, as it has not been inaptly termed, the Mediterranean Sea of North America, is a large inland sea, situated between the parallels of 51° and 64° N. lat., and, therefore, well outside the Arctic zone, and between the meridians of 78° and 95° W. long. It is about 900 miles in length from north to south, and some 600 wide, covering an area of something like 500,000 square miles.

Hudson's Bay is reported to be remarkably free from rocks and shoals, and it has an average depth of about 70 fathoms. So uniform

are the soundings, that our accomplished associate, Dr. Bell, of the Geological Survey of Canada, in a paper which he communicated to our Society in October 1881, on the commercial importance of Hudson's Bay, had no hesitation in saying that if, through any convulsion of nature, this vast basin was to be drained of its water, we should find an immense plateau similar to the prairies of the West.

I would observe that there are few authorities on this subject whose opinions should be received with greater respect than those of Dr. Bell, who has devoted many years of his life to the exploration of Hudson's Bay, and whose knowledge and experience regarding the physical geography and geology of that part of the world are so well known.

The same authority states that storms in the bay are very rare and by no means formidable, that icebergs are never seen, and that fogs, the most dreaded enemy with which a sailor has to contend, are of rare occurrence and of but short duration. The climate of the shores of Hudson's Bay, during the summer months, is mild and genial, and many European vegetables, such as potatoes, lettuce, beet-root, and onions are grown in the open air. The winters are, however, very severe.

It is asserted that the temperature of the water in Hudson's Bay is no less than 14 degrees higher than the water of Lake Superior, and in support of this assertion Lieutenant Gordon (who was sent by the Canadian Government in command of the recent expeditions despatched to Hudson's Bay for the purpose of reporting on its feasibility as a commercial route) writes, in his first official despatch, that "Hudson's Bay may, therefore, be regarded as a vast basin of comparatively warm water, the effect of which must be to ameliorate the winter climate to the south and east of it."

The principal and, so far as we know at present, the only practicable approach to Hudson's Bay in a ship is through Hudson's Strait, a deep channel about 500 miles in length, which separates Labrador from the islands of Arctic America. The strait has an average breadth of about 100 miles, but the width in the narrowest part of the channel is not more than 45 miles. The soundings in the strait vary from 150 to 300 fathoms, and it is wonderfully free from shoals and rocks, or any other obstacles that would tend to make the navigation of a narrow channel more than ordinarily dangerous.

The accounts of early voyages to Hudson's Strait are important to us, because they form cumulative evidence respecting its navigability in the months when such voyages were undertaken. John Davis, when he was returning from the extreme northern point he reached in 1587, passed across the mouth of the strait on the 1st August, and thus remarked upon it: "This inlet or gulf we passed over: where, to our great admiration; we saw the sea falling down into the gulf with a mighty overfal and roing, and with divers circular motions like whirle-

pooles, in such sort as forcible streames passe thorow the arches of bridges." On the Molyneux Globe of 1593 (now the property of the Benchers of the Middle Temple, and which was lent to this Society for the Exhibition of Educational Appliances) the very words of Davis are written at the entrance of Hudson's Strait, namely "Furious Overfall."

This is one out of several proofs that Davis had a hand in the construction of that famous globe. In 1602 Captain Waymouth, during a voyage organised by the East India Company, reported that he entered an inlet in the same latitude.

Hence it was that Captain Luke Fox, who subsequently made a voyage into Hudson's Bay, recorded the very true and apposite remark that "these two—Davis and Waymouth—did, I conceive, light Hudson into his straights."

In 1610 Henry Hudson was despatched in the little *Discovery*, of 55 tons, with a crew of 21 men, to find the North-west Passage by way of the opening discovered by Davis, and marked on the Molyneux Globe as the "Furious Overfall." The labours of Hudson bore rich fruit, and he deserves a high place among our early geographers. His name is never likely to be forgotten: it is borne by the strait and by the great bay to which it leads. It is inscribed on the vast territory between that bay and the Pacific Ocean. It is affectionately remembered by the thousands of happy families now living on the banks of that beautiful river, which he found scantily inhabited by savage tribes. It was Hudson who opened to his own countrymen the fisheries of Spitzbergen and the fur trade of the Hudson's Bay Territory. The Dutch owed to him their North American colony, which afterwards became the English colony of New York. He thus built up to himself a far more enduring monument than his fondest dreams could have anticipated. His successes may well be held out as an encouragement to those who, like him, labour earnestly and steadfastly in some great cause which may seem almost hopeless.

Henry Hudson entered the strait which bears his name in the end of June 1610, and was at first much troubled by the amount of ice he encountered. For some time he experienced difficulty in making his way to the westward; and on the 11th of July, fearing the approach of a storm, he anchored under the shelter of three rocky islands to which he gave the name of "the Isles of God's Mercy." They are marked on our present charts as the "Middle Savage Islands." Thence he pushed his way westward to the Digges Islands and Cape Wolstenholme, at the entrance of Hudson's Bay, but, unfortunately, this is the last recorded incident in his journal. For an account of the remainder of the voyage we have to trust to the narrative written by one of the survivors, which, although of thrilling interest, contains little geographical information. The story of his wintering, of the mutinous conduct of the crew, and of the abandonment of Hudson and his son in an open boat, is told by this

survivor, named Habakuk Prickett. The *Discovery* returned through Hudson's Strait early in the August of 1611 without any difficulty, and the reports of the survivors led to the despatch of another expedition in the ensuing year.

Sir Thomas Button, who commanded the expedition of 1612, in the *Resolution*, proceeded through the strait in June, and reached Digges Island without much hindrance from the ice. He wintered on the west coast of Hudson's Bay, and returned through the strait in the summer of 1613 without any difficulty whatever. But, instead of emerging from the main entrance of the strait, Sir Thomas Button took his ship between the island on which Cape Chidley is situated, and the mainland of Labrador. This channel has recently been named M'Lellan Strait, after the Canadian Minister of Marine and Fisheries, under the impression that it is a new discovery. *Resolution* Island is the name of the island on the north side of the entrance to Hudson's Strait. If the island on the south side, on which Cape Chidley is situated, was called *Discovery* Island, we should then have the two portals of the strait named after the two first ships that ever passed a winter in Hudson's Bay.

The enterprising company of merchant adventurers was not discouraged by the failures of Hudson and Button. In 1615 they again despatched the little *Discovery*, under the command of Robert Bylot, with that accomplished navigator, William Baffin, as pilot. During this voyage, Hudson's Strait was entered towards the end of May, and on the 8th of June the Savage Islands were reached and named. Proceeding westward along the northern shore, the *Discovery* stopped at a place called Broken Point. The spot is memorable because here the first lunar observation ever observed by an Englishman, for finding the longitude, was taken by William Baffin. This admirable pilot drew a most interesting chart, on which the coast-line and prominent headlands and islands are delineated, with a fair approach to accuracy. There were some delays in passing through the strait, owing to loose ice, but they were clear of it by the 1st of July. On her return in August the *Discovery* passed through the strait without encountering any obstacle whatever. But the great mistake made by Baffin, and indeed by all the old Arctic navigators, was that they relinquished exploration too early in the season.

In 1619 Captain Hawkrigde sailed through the strait; and in the same year a Danish expedition under Munk also entered the bay, neither commander encountering any serious obstacle. Twelve years afterwards two vessels were fitted out, one at London, the other at Bristol, under the commands of Captain Luke Fox and James respectively, which entered Hudson's Bay.

Captain Fox was a quaint and witty writer, as well as a bold seaman. His description of the ice he met with in Hudson's Strait is so good, and so exactly coincides with my own experience of the ice in that locality,

that it will be well to quote it. He says: "The ice in the strait consists of two kinds, one of which is mountainous (a huge piece, compact, of great quantity, some more some less), but in this freet" (as he calls the strait) "you seldom have any bigger than a great church, and most thereof lesse." This description of course has reference to the icebergs met with at the entrance and in the eastern part of Hudson's Strait. He then describes the floe or pack ice as follows:—"The other kind is smaller, and is what we call masht or fleacht ice. Of this you shall there have numbers infinite, some of the quantity of a roode, some a perch, some an acre or two acres. But the most is small and about a foot or two above water, and eight or ten under water, and these are they which do enclose you; so as in much wind, from the topmast head, you shall hardly see any water for them. But while you lie amongst them it is so smooth as you shall not feel the ship stirre." It would not be possible to give a more accurate account of the conditions of the ice in Hudson's Strait at the present day, than is furnished by this description written by Captain Luke Fox more than 250 years ago. It exactly describes the peculiar nature of the ice that is usually met with during the navigable season in this channel, and which I have not observed in any other part of the northern regions. Fox found little difficulty in passing through the strait, and was in Hudson's Bay by the 21st of July. His return voyage, during October, was still more easy, for he encountered no obstacle whatever, and was off Resolution Island on the 31st of October. Captain James, whose voyage was undertaken in the same year, 1631, reached the entrance of Hudson's Strait on the 24th of June, but was delayed in consequence of striking on a rock, and did not complete the passage of the strait until the middle of July. James wintered in the southern extremity of Hudson's Bay, and in 1632 he again passed through the strait, on his way home, without any difficulty whatever.

No further attempt was made to visit these seas, until a charter was granted to Prince Rupert and some enterprising merchants in 1669, and the Hudson's Bay Company was founded. Captain Gillam, in the *Non-such*, was then sent out. He passed through Hudson's Strait without difficulty, and established a settlement near James's winter quarters, which he called Fort Charles. He returned the following year.

From this date, for a period of fifty years, no interest appears to have been taken in geographical research in the Hudson's Bay region; although the Company's ships were frequently engaged in making the voyage from and to England. But at last two ships were fitted out by the Hudson's Bay Company for purposes of discovery, commanded by Captains Barlow and Vaughan; they were accompanied by Mr. Knight, an official of the Hudson's Bay Company who had suggested the voyage, and who was nearly 80 years of age. They sailed from Gravesend in 1719, but three years elapsed without any tidings of them being received.

A ship called the *Whalebone* was sent from Churchill in search of them, under the command of Captain John Scroggs, in June 1722, but without result. It was not until the year 1767 that the melancholy fate of the missing ships was ascertained by some of the Company's boats engaged in the whale fishery. The ships had been wrecked on Marble Island, and the crews had perished after reaching the shore.

The next important expedition was that commanded by Captain Middleton, which left England in 1741; and this was followed by another, under Captain Moor, in 1746. Middleton passed through Hudson's Strait without difficulty, and although Moor was baffled by pack ice for several days, he succeeded in making the passage early in the season. Mr. Wales, who was sent out by the Royal Society in 1768, also passed the strait with ease. In fact he was only nine days in going through, during which time he met with no ice to interfere with the progress of his ship, although he was delayed by contrary winds and calms.

During the whole of the eighteenth century vessels belonging to the Hudson's Bay Company made annual voyages to, and from, England to York and Moose Factories. They very rarely failed to make the voyage, and few of the ships were lost. One of the masters in the Company's service, Captain Coats, who had been many years employed in navigating those seas, wrote a practical and very interesting treatise in 1750, which he named 'The Geography of Hudson's Bay.' It has been printed for the Hakluyt Society, and was edited by our associate, Mr. John Barrow.

An expedition of discovery, sent out at the instance of the Hudson's Bay Company in 1791, under Captain Duncan, forms an exception as regards the easy navigation of the strait. The vessel encountered much ice, which so delayed her that it was not until the 5th of September that Captain Duncan reached Fort Churchill.

We now come to the expeditions of Sir Edward Parry in 1821-23, of Captain Lyon in 1824, and of Sir George Back in 1836. The events of these memorable voyages are well known, and are indeed matters of history. Parry encountered much ice at the entrance of Hudson's Strait on the outward voyage, and nearly the whole month of July was occupied in getting through it. But the delay was occasioned as much by adverse winds and calms, as by the ice. On July 21st Parry wrote: "Bodies of ice became less and less numerous as we advanced up the strait from Resolution Island, and no ice was seen after we had proceeded a few leagues beyond the Upper Savage Islands." On the 25th he reported "the sea almost free from ice"; and on the 27th and 28th "ice in great quantities, but the pieces so loose as easily to allow the passage of a ship with a free wind. This ice was so honeycombed, and rotten, that it appeared in a fair way of being entirely dissolved in the course of a few weeks." This was, in all probability, ice that had drifted down

through Fox's Channel. The weather was on the whole fine and clear, only four foggy days being recorded during the month of July.

During the return voyage, in September 1828, Parry was only five days passing through the strait, during which time no ice whatever was to be seen.

Regarding the best time for navigating the strait, Sir Edward Parry says: "Long experience has brought those who frequent this navigation to the conclusion that, in most seasons, no advantage is to be gained by attempting to enter Hudson's Strait earlier than the first week in July. The annual disruption of the ice, which occupies the upper and middle parts of the strait, is supposed not to take place till about this time. In the course of one single year's experience in these parts, we have seen nothing to recommend a practice different from that at present pursued by the ships of the Hudson's Bay Company."

I heartily concur with every word in this quotation, for it exactly corresponds with my own experience. But the fact must not be overlooked, that this advice is addressed to those who attempt the navigation of the strait in sailing ships. Steam has made a great revolution in ice navigation. A well-found steamer is able to make her way with ease through the ice in Hudson's Strait in June and July, when a sailing ship would be hopelessly beset, and incapable of pushing on. With regard to the practice pursued by the ships of the Hudson's Bay Company, alluded to by Sir Edward Parry, it stands to reason that the captains of those ships would naturally delay their passage across the Atlantic, so as not to reach the strait before July or August; for they were well aware that every extra day spent on the passage was a day nearer the disruption of the ice. Their experience told them that a policy of waiting was the wisest, when the chances would be more in their favour of getting through without hindrance from the ice.

In 1824 Captain Lyon, in the *Griper*, passed through the strait in fourteen days, namely from the 6th to the 20th of August. He sighted some loose heavy ice off Resolution Island, but otherwise experienced no difficulty in getting through. On his homeward voyage no ice whatever was seen in the strait, and he averaged, in his dull old bluff-bowed sailing ship, 150 knots a day, as he passed through, from Cape Wolstenholme to Resolution Island.

During Sir George Back's memorable and eventful voyage in the *Terror* in 1836, he encountered much ice in the strait. But this appears to have been an exceptionally bad ice year. Still he was not more than a fortnight in getting through, namely from the 1st of August, when he was off Resolution Island, to the 14th, when he passed Nottingham Island. His course was then directed up Fox Channel, where his ship was closely beset by heavy ice, in which, helplessly drifting at the mercy of the winds and currents, he was compelled to pass the winter. During

a period of six months the ship drifted 234 miles in a generally south-east direction.

It is almost impossible for us to conceive, much less to describe, the anxiety that must have been experienced on board the *Terror* during those long dark months, when officers and crew were, it may truly be said, momentarily expecting the destruction of their floating home. She was most miraculously preserved, in spite of the terrible injuries inflicted on her by the ice, and she succeeded in making one of the most marvellous voyages on record across the Atlantic. The objects of Sir George Back's voyage were unfortunately frustrated by the ice in Frozen Strait. But although the amount of geographical information obtained was not very great, yet the voyage was exceedingly instructive, as showing the general drift of the ice down Fox Channel and Hudson's Strait.

The account of the *Terror's* voyage home embraces one of the most thrilling stories of sea adventure that has ever delighted the readers of this country. When all hope of saving the ship and the lives of the crew had almost died out in the breast of the captain, the coast of Ireland was sighted; Captain Back then succeeded in running the *Terror* on shore off Buncrana, in Lough Swilly. The men were harassed and nearly worn out by their exertions in keeping the ship afloat; and the vessel herself, leaking like a sieve from the injuries she had received in the ice, was only held together by the stream cable being passed round the after part, and so binding her timbers and planking.

This was the last Government expedition, having geographical research solely for its object, that entered Hudson's Bay. But its waters have been navigated by the ships of the Hudson's Bay Company year after year. These vessels were annually despatched from England for York and Moose Factories, sometimes two, and even three being sent in a year. They rarely failed to reach their destinations, for, arranging as they usually did to reach Hudson's Strait, on their outward voyage, in about the first week of August, they experienced but little difficulty from the ice. On their return voyages in September and October, they always found the strait comparatively clear.

I have in my possession an official record of the voyages, out and home, of the Hudson's Bay Company's ship *Prince Rupert* for a period of eleven consecutive years, namely, from 1835 to 1846 inclusive. I find that the average time of getting through the strait, on the outward voyages during this period (and it must not be forgotten that the strait is 500 miles in length), was 16 days. The longest time was 31 days, when there was probably an exceptionally bad ice year. The shortest time was eight days. But the delays in getting through the strait were invariably caused by calms and adverse winds, and not by the ice. On the homeward passages no difficulties were met with from ice in the

strait, and the vessel usually reached London in about five weeks after leaving York factory. The earliest date for sailing from York factory was the 6th of September, and the latest the 3rd of October. In the latter case the *Prince Rupert* was 38 days on the passage to London; so that it is impossible she could have had any serious detention from ice in the strait.

It must be remembered that this vessel, and all others then employed by the Hudson Bay Company, were sailing ships, dependent entirely on sails for their motive power. Without wind they were helpless; with a foul wind their progress was of course proportionately slow. Wind, therefore, was a matter of the first importance in those days, when a vessel was endeavouring to make way through floes of loose ice; for when the wind falls, the ice invariably loosens, or, as the technical expression is, "goes aboard." But, under such circumstances, the unfortunate sailing vessel, being deprived of its only propelling force, is unable to take advantage of the ice being loose to push on. On the other hand, when a breeze springs up, which on ordinary occasions would possibly enable her to make good way, the wind has the effect of packing the ice, thus rendering progress nearly impossible.

Steam has now, however, effected a complete revolution in ice navigation, and the most advantageous time for pushing on is, of course, in calm weather, when the ice is loose. Under similar conditions a sailing vessel would be utterly hopeless. It is, therefore, only reasonable to infer that what has been performed regularly, and year after year, by sailing ships, can be accomplished with greater regularity and certainty by well-found steamers, specially constructed for ice navigation, and provided with powerful machinery. A channel which has been navigated for 270 years, first by the frail little fly-boats of the seventeenth century, then by the bluff-bowed, slow-sailing, exploring vessels of Parry's days, and for a long period by the Hudson's Bay Company's ships, cannot be very formidable, and if sailing ships can annually pass through it, *à fortiori* steamers will find less difficulty in doing so. But it would, of course, be necessary that such steamers should be specially built and equipped for the service, and it is desirable that despatch should be used in making the voyage.

The nature and consistency of the ice in Hudson's Strait are such that, with an efficient steamer, the passage could be accomplished with very little delay or difficulty. This being the case, it is not surprising to hear that the people of the North-West are anxious to have a sea-port on the shores of Hudson's Bay, and to secure the construction of a railroad to connect such a port with Winnipeg, or some other equally convenient dépôt on the newly established line of the Canada and Pacific railroad.

The achievement of such an undertaking would result in shortening the distance that the produce of the country, destined for exportation,

would have to be transported by one-half. As the cost of transport by rail is governed by the distance to be conveyed per mile, it will at once be understood that if the mileage is reduced by one-half, the cost of conveyance will be diminished in the same proportion. It has been estimated that the result of the construction of a railroad from Winnipeg to Hudson's Bay, would be a clear gain to the farmers and producers of the North-West, of about 3*l.* per head on all cattle exported, and 5*s.* upon every quarter of grain sent for shipment.

The only obstacle to the establishment of the desired port, and to the opening of this route, is the belief in the formidable character of the ice that, we are told, would have to be encountered in Hudson's Strait, and the consequent limited duration of the navigable season.

There has been great controversy on this question. The advocates of the route maintain that the ice offers no obstacle which may not be overcome. Monopolists, and persons interested in other routes, represent the difficulties offered by the ice in Hudson's Strait as fatal to the success of the project. The question is a purely geographical one, its solution depends on physical considerations, and the controversy is therefore a clear gain to the science of geography.

In order to obtain full and accurate information on the questions involved in the discussion, the Government of Canada, with commendable energy and a praiseworthy determination to solve the long-disputed problem as to the practicability of navigating the strait annually, came to the resolution of despatching a vessel for the purpose of establishing stations on both sides of Hudson's Strait, at which continuous daily observations could be taken and recorded on the weather, tide, temperature, condition and movements of the ice, and other facts connected with the meteorology of that region, for a period of at least twelve consecutive months. A steamer called the *Neptune*, which had been built for and employed in the sealing trade, was chartered and despatched in the year 1884 to perform this service.

The *Neptune* was in every way admirably adapted for the work she was required to perform, having been specially constructed for ice navigation. Her voyage was eminently successful. She experienced little difficulty in passing through Hudson's Strait, and succeeded in establishing stations at the following places. One, named Port Burwell, near Ungava Bay on the south side of the Strait, close to the entrance. Another in the vicinity of the Upper Savage Islands, at Ashe Inlet. Another was immediately opposite, on the south side of the strait (Stupart Bay). The fourth station was on Nottingham Island, and the fifth was established on Digges Island, at the opening into Hudson's Bay. An observer, with a couple of attendants, was placed in charge of each of these stations, with a supply of provisions to last over twelve months.

In the official report of the voyage of the *Neptune* whilst engaged on this service, her commander states that had he been making the passage

direct to Churchill, instead of coasting and visiting specially selected places on both sides of the strait, he would not have been delayed by ice for more than about forty-eight hours. On the homeward voyage down the Strait there was no check whatever, no ice having been encountered. The *Neptune* can, I believe, fairly lay claim to the honour of having been the first steam vessel that has ever crossed the waters of Hudson's Bay.

On the return of the *Neptune* to Halifax, steps were immediately taken to secure the despatch of a vessel to Hudson's Strait in the following year, for the purpose of visiting and relieving the stations established there.

In order to assist the Canadian Government in their praiseworthy endeavours to obtain reliable and accurate information regarding the navigation of the Strait, the English Government placed H.M.S. *Alert*, (a vessel which had already gained for herself a reputation in Arctic research) at their disposal. She was officered and manned by the Canadian Government, sailed from Halifax, and reached the entrance to Hudson's Strait on the 16th of June, 1885. But through some mismanagement, or want of experience in ice navigation on the part of those who were occasionally entrusted with the charge of the ship, she was allowed to be beset by the ice. No advantage appears to have been taken of her steam power to extricate her. In fact, the reverse seems to have been the case, for in the official report of this voyage we read that, instead of utilising the power that was at their disposal to release her from her imprisonment, they "banked the fires and left the ship to pull under a fore-topsail and fore-topmast staysail."

The "pull," however, does not appear to have been in the desired direction, or, if so, it was misapplied, for we learn that shortly afterwards the stem of the ship was so seriously injured by coming into contact with the ice, that it was considered not only desirable but necessary to return to the southward, and they put into St. John's (Newfoundland) in order to effect the necessary repairs. The repairs were, however, easily and speedily executed, and by the first week in August the *Alert* was again in Hudson's Strait. The next few days were employed in visiting the stations established during the previous year, which was done without much difficulty, and on the 31st of the same month the *Alert* reached Port Churchill, having spent a few days at each station. When her duties were completed she sailed for Halifax, meeting no ice whatever during the return journey, although it was the 7th of October before she was clear of the Strait.

The reports obtained from different stations regarding the presence and conditions of the ice in the Strait, supplemented as they were by those received from the *Neptune* and *Alert*, were on the whole decidedly satisfactory, in so far as they bore on the question of the safe navigation of Hudson's Strait during a certain period of the year.

In the following year, namely 1886, it was again resolved to despatch

the *Alert* to Hudson's Bay. But this time it was with the object of dismantling the stations in the Strait, and taking the observers back to Halifax. It was considered that the duty on which they were employed had been accomplished.

By a fortunate accident I was able to avail myself of an invitation I had received, to take a passage in the *Alert* during this cruise.

I considered myself very fortunate in having the opportunity afforded me of doing so, for it had long been my wish to visit Hudson's Bay, and I had almost decided upon accomplishing this object by travelling from Winnipeg by canoe. The offer, therefore, of going in the *Alert*, which would enable me to make the passage of the strait, as well as of the bay, was too good to be refused, and I eagerly availed myself of it. I was thus enabled to form my own judgment of the state and conditions of the ice in Hudson's Strait during at least one season of the year; while my observations, combined with a comprehensive study of all that has been written on the subject, would enable me to form my own views regarding the practicability of the route as a commercial highway. I was also able to form a better estimate relative to the duration of the navigable season.

I might observe that I was quite ignorant of the controversy that had been carried on for some time between those who were in favour of Hudson's Strait as a commercial route and those who were opposed to it. I was, therefore, in a better position to form a perfectly impartial and unbiassed opinion.

Under these circumstances I joined the *Alert* at Halifax, and sailed in her from that port on the 23rd of June.

On the 5th of July we reached the entrance of Hudson's Strait, where we were detained for some days, partly by thick weather and partly by loose streams of ice; but the latter were never packed sufficiently close to prevent even a slow steamer like the *Alert* from making fairly good progress. The ice that we encountered was of a soft brashy consistency, the greater part of it being honeycombed from the action of the water, and in an advanced stage of disintegration. Whilst thus delayed at the entrance of the strait, we observed the same remarkable commotion of the water that had been commented on by Davis, Parry, Back, and other navigators. Davis called it, on the globe of 1593, the "Furious Overfall." It is not easy to account for these turbulent eddyings and overfalls. We frequently observed comparatively large pieces of ice being swept, with great velocity, in opposite directions, although they were close to each other. The ice, on these occasions, was evidently very much influenced by local forces, such as tides. So far as we were able to discover, the flood—or west-going tide—caused the ice to slacken, whilst a contrary effect appeared to be exercised on it by the ebb. From the 9th to the 11th of July scarcely any ice was seen, and a distance of over 200 miles was accomplished in about thirty-six hours. This fact alone, without further

evidence, is in itself sufficient to show how free the eastern part of the strait was from ice; for the *Alert*, if driven at her full speed, could only steam about six knots an hour.

Early on the morning of the 11th of July we arrived off the station on the north side of the strait, and anchored in a snug little bay called Ashe Inlet. The observers were found to be in perfect health, and they had spent a pleasant winter, having been well supplied with reindeer meat by the Eskimos. They informed us that the ice did not form in the strait before December, and that the channel was perfectly free for navigation during the entire month of November. Game appeared to be plentiful in the neighbourhood of the station. Numerous herds of reindeer were met with during the winter, and hares were reported as abundant on an adjacent island; whilst bears, seals, and walrus were frequently seen.

After leaving Ashe Inlet the *Alert* continued her passage through the strait, but her progress was so retarded by ice, that it took her nine days to accomplish a distance of 300 miles. This slow progress was mainly caused by the absence of sufficient steam power to enable her to thread her way through the loose ice, and also by a want of vigilance in taking advantage of the various movements of the ice. A knowledge of ice navigation, like everything else, cannot be acquired at once. Practical experience, unceasing vigilance, and a happy knack of doing the right thing at the right moment, are essential qualifications for those seamen who desire to become successful ice navigators.

The ice that we encountered in the western part of the strait was somewhat different, and heavier than the ice we passed at the eastern entrance. It was composed of small pieces, packed loosely, appearing as if the floes had been broken up and then drifted together. This peculiar feature of the ice in Hudson's Strait is one that I never observed in other northern seas, and it is worthy of consideration when the question of the practicability of navigating the strait is under examination. For it is these innumerable small pieces that, in a great measure, deprive the pack of the force necessary for the serious injury of any vessel that is beset in it. When there is a nip, the small pieces, being composed of soft brashy ice, act as a cushion between the ship and the larger floes, thus protecting her from violent pressure.

The greater part of the ice was, in my opinion, formed in Fox Channel, whence it drifts down to the strait after the disruption of the ice in the summer. Occasionally a few large floes were seen, some of which I estimated to be about half a mile in length, but a floe of this size was quite exceptional. The average thickness of the floe ice was 9 feet, but it was all more or less rotten, and rapidly dissolving.

A circumstance worthy of note in connection with the heavier and larger floes that we met with, was the irregularity and unevenness of their surfaces. A perfectly level floe of any extent, having a flat

surface, was rarely seen. They were usually crowned with a succession of excrescences resembling small hillocks. This gave me the impression that the floes were composed of many small pieces of ice which, having survived the preceding summer's thaw, had been cemented together into one large mass by the snow and frost of the succeeding winter. Many of these floes were discoloured by dirt and débris, and on a few of them I noticed thick mud adhering, showing that they were formed in the immediate vicinity of land. The heavier ice we encountered, had probably drifted down from Fox Channel, where large thick floes are known to exist.

No icebergs were seen to the westward of the Savage Islands, which seems to show that all those we passed to the eastward and at the entrance of the strait, had floated down from Davis Strait, or at any rate were the produce of glaciers north of Resolution Island. During the time that we were in the strait the weather was generally fine, the average temperature being about 35° Fahr., although on some days the thermometer would rise to 50°. The prevailing wind was from the westward, but from whatever direction it blew, it appeared to have but little effect on the movements of the ice. When we have more accurate information regarding the tides in Hudson's Strait, further light will in all probability be thrown on the movements of the ice.

After being in the ice for upwards of eight days, the *Alert* arrived at Digges Island (where one of the observatories had been established) on the 20th July. This island, which forms a leading feature in the story of Hudson's voyage, consists of bare hills of gneiss, rising to a height of about 500 feet. The hills are intersected by broad valleys, carpeted with moss and coarse grass. The vegetation compares very unfavourably with that of some of the small islands on which I have landed off Novaya Zemlya, and which are in a much higher latitude. On the coasts of the latter the southern current warms the air and produces a comparatively luxuriant flora, while the former is exposed to cold Arctic streams.

After leaving Digges Island the open water of Hudson's Bay was reached, and from that time, with the exception of passing through a few loose streams of broken-up stuff, no ice was seen. The *Alert* dropped anchor in Churchill Harbour on the 29th of July, without encountering any further difficulties from the enemy with which she had been contending for ten days. From Churchill we proceeded to York Factory, where I left the ship, proceeding on to Winnipeg by canoe.

On her return passage through Hudson Strait, the *Alert* revisited the different stations without experiencing any difficulties from the ice, and having embarked the observers and their attendants, she returned to Halifax.

The result of all the experience, gathered from voyages during two centuries, and from more recent observations at the stations, is that

Hudson's Strait is perfectly navigable and free from ice in August, and later in the season. It must be remembered that this passage has been successfully accomplished nearly every year for the last two centuries, while the vessels that have been employed on the service have been ordinary sailing ships, dependent entirely on wind and weather. It is very rare indeed that they have failed to get through, and still more rare that any of them have been destroyed by the ice. It appears from the official records of the Hudson's Bay Company that Moose Factory, on the southern shore of the bay, has been visited annually by a ship since 1735, with but one exception, namely in 1779, when the vessel for once failed to achieve the passage of the strait. The percentage of losses by shipwreck among these vessels employed in Hudson's Bay is far less than would have to be recorded in a like number of ships engaged in general ocean traffic. Since the keel of Hudson's good ship the *Discovery* ploughed the waters of the strait, the passage has been made over 500 times, whilst the losses due to the ice might be summed up on the fingers of one hand; and some of these losses were due to causes with which the ice had nothing to do. For instance, the recent loss of the *Cam Owen* was in no way connected with the ice.

In conclusion, after reviewing the physical aspects of the region, and the record of voyages, we must again call to mind the fact that the vessels employed on Hudson's Bay service have hitherto been sailing ships. Steam has now robbed ice navigation of many of its difficulties and dangers, and it is only fair for us to assume that, with the appliances that science has since revealed to us, we can, in these days, achieve with greater ease and celerity, and with more assured certainty, as much as was accomplished by Hudson and Baffin, by Button and Luke Fox, in their rude and poorly equipped fly-boats.

The vessel, however, to be employed on such a service, should be specially constructed to resist ordinary ice pressure, and should be provided with power to be able to steam from 10 to 12 knots at least. We in the *Alert* were frequently detained for many consecutive hours at a time, for want of power to propel the ship through loose streams of ice, which an ordinary steamer would have had no difficulty in penetrating. It is necessary that all vessels employed in ice navigation should be strengthened, especially in the bows, not so much for the purpose of resisting the pressure of the ice, if beset, as to repel the severe blows which must occasionally be inflicted by unavoidably striking unusually heavy pieces, whilst threading their way through a stream of ice.

The case then can be very briefly stated. If sailing ships have annually taken the furs, and other merchandise, of the Hudson's Bay Company through the Strait for the last two centuries, *à fortiori* it may be looked upon as certain that powerful steamers will be able to do the same for the produce brought to the west coast of Hudson's Bay by a railway from Winnipeg.

The establishment of new routes for commerce is always a gain to the science of geography. In some cases new regions have to be discovered and explored. In others the physical aspects of an already known region must be more carefully studied, and many points of interest relating to the action of climate, or of winds and currents, may be ascertained. The proposed Winnipeg and Hudson's Bay railroad is a striking instance. The objections of opponents to the route have had to be carefully examined. All former experience had to be collected, maturely considered, and passed in review. Observatories had to be established at several points, to make certain whether the historical records actually coincided with physical facts as they now exist. The route itself had to be sailed over and explored. All these various researches have been as great a gain to geography as to commerce. They have enriched our science with a fresh stock of information, have revised previous conceptions, and confirmed or rejected, as the case may be, the theories and views which may have been put forward. From this point of view, and from this point of view alone, can commercial or political questions receive consideration here. The study of the Hudson's Bay route involves a problem for which physical geography alone can furnish a solution; and on those legitimate grounds I have ventured to submit it for the consideration of the meeting. My labours will be more than rewarded if I have succeeded in my endeavour to give a new point of interest to a region which, though already well known, is exceedingly interesting, and is on the direct road to unknown parts of the earth.

The following discussion ensued:—

Sir CHARLES TUPPER said he had listened to the paper with unqualified pleasure. It was impossible to look at the map of North America without seeing how vitally important every question became that had a bearing upon the increase of facilities for intercourse between Canada and the British Islands. The American Consul, Mr. Taylor, who has lived for more than twenty years at Winnipeg, whose knowledge of the country is not exceeded by that of any other person in it, and who might be assumed to speak in an entirely disinterested manner, had stated that of the remaining undeveloped wheat-fields in North America, three-fourths were to the north of the boundary-line. During the last season 16,000,000 bushels of grain were produced in Manitoba and the North-west Territory. It was therefore manifest that it was of the utmost importance to obtain the nearest and best route for disposing of the produce. The chief outlet from that great granary was at present by means of the Canadian Pacific Railway, which ran from Vancouver down to Montreal and Quebec, from whence the grain was taken by ocean steamers to England; but another outlet was by the great inland navigation from the head of Lake Superior to the Straits of Belle Isle. A line of communication viâ Hudson Bay would bring Winnipeg, the capital of Manitoba, 1100 miles nearer to this country than by the route viâ New York. That fact gave immense importance to the investigations which had been made in connection with the navigability of Hudson Bay. It was perfectly apparent that if the territory were only half developed it would tax beyond their capacity all the resources of the Canadian Pacific Company, and also the resources of an additional line of railway to Churchill. The Canadian Pacific

Company, which owned 14,000,000 acres of this great wheat-field, would be only too glad to see additional facilities afforded between that region and Europe. Under these circumstances, it was very gratifying to learn that Commodore Markham was able to add his personal testimony to the experience of those who had endeavoured to open up that country, and to give so many reasons for entertaining the belief that it might be found practicable to establish a comparatively safe route for the trade for several months of the year. It was true that the officers sent there by the Canadian Government had not taken so sanguine a view, but Commodore Markham was a higher authority than any one who had been employed there by the Government. If it could be demonstrated that for four or five months in the year a fairly safe communication could be established by that line, he had no hesitation in saying that the day was not far distant when a railway would be made from Winnipeg to Fort Churchill. The Government of Canada had not only sent various expeditions to Hudson Bay for the purpose of testing its navigability, but they had obtained from the Canadian Parliament 7,000,000 acres of land for subsidising and constructing a line of railway 700 miles long from Winnipeg to Fort Churchill.

Dr. RAE said he had made three voyages through Hudson's Strait in sailing vessels. On the outward voyage, in the month of July, the ship was closely beset in very heavy ice at the east end of the strait, near the Lower Savage Islands, for three weeks, there being little or no open water to be seen from the masthead for nearly the whole of that time. The pack was of such large and level floes that two English ladies, not accustomed to such work, frequently walked without difficulty from one ship to the other—1½ miles apart—took lunch, and returned the same day. It was similar ice to this that blocked up the *Alert* for about twenty days near the same locality in 1885, and it was near the same place in May and June 1886 that the whaling steamer *Arctic*, of Dundee, the finest vessel in the world for ice navigation, was helplessly drifted about for eight or nine days in the ice-pack until released in the strait near the Savage Islands, from which place it took this powerful vessel *thirty-eight days* to reach the western end of the strait at King's Cape, a distance of about 500 miles, on the 10th July, having steamed along the north shore, which is often the freest from ice. The floes met with were from 15 to 20 feet thick. He (Dr. Rae) brought forward the voyage of the *Arctic*, commanded by an able and experienced whaling captain, because Commodore Markham had stated that the difficulties met with by Lieutenant Gordon in passing through the strait were to be accounted for by mismanagement or want of experience in ice navigation, and to the defective steam power of the *Alert*, "*which could steam only six knots an hour.*" Lieutenant Gordon several times records in his log or journal that the *Alert* could and did steam at the rate of eight knots. It is very evident that this, according to Markham, slow little vessel and incompetent commander made quite as good progress through the ice in the strait as the larger and far more powerful steamer *Arctic*, and her well-known experienced commander in icy seas. The writer of the paper quotes Dr. Bell as a distinguished and reliable authority in all matters relating to Hudson's Bay and Strait. He (Dr. Rae) knew no one on whom he could place less reliance on these subjects, but he would only give two reasons, of many, why he entertained this opinion. Dr. Bell, wishing to make it appear that the shores of Hudson's Bay are well fitted for settlement, caused some tomatoes to be planted in a well-sheltered corner, on the south exposure of the wooden walls of Moose Fort, and had the plants carefully nursed and attended to, so that one or two sickly-looking tomatoes about the size of walnuts were raised, which gave Dr. Bell an opportunity to write that tomatoes grew and ripened in the open air at Moose! He also stated that barley grew and ripened well, whereas it ripened on an average one year in about five. With the same object he took the temperature of the waters of the bay whilst in a boat

close along the shore, where the sea was warmed by water from numerous rivers, which, being fresh and at a higher temperature than the sea, floated on the surface, and gave a temperature of about 53° , whereas the real sea water at a few miles from land is from 15° to 20° colder, as has been often proved. But Dr. Bell gave 53° as the temperature of the whole bay. Although Moose is about 15 miles south of Greenwich, ice may be seen as late as August or September about 20 or 30 miles from that place in the bay, which acts as a refrigerator to an immense extent of land, which otherwise would be comparatively fertile. There is not the slightest difficulty in navigating Hudson's Bay for five months in the year, nor in constructing a railway from Winnipeg to its shores. The total obstruction lies in the straits, and in the 50,000 square miles of heavy ice that forms yearly in Fox's Channel, the whole or greater part of which drifts down annually under various conditions and at uncertain times from the middle of July to September or perhaps October, into the west end of the strait, blocking it up, and also the entrance to Hudson's Bay.* How could Commodore Markham tell from his own small experience of eighteen or twenty days in July, nine of which were occupied by the *Alert* steaming 250 miles, during which one of the blades of the screw was broken by the ice, that the strait was navigable for five months or more? It would be satisfactory to know on whose information he relied, for he is repeating exactly what the promoters of the Hudson Bay route said two or three years ago. Are promoters' statements always to be relied upon?

Mr. W. SHELFORD said he had visited the salient points of the proposed Winnipeg and Hudson's Bay railway, and he had also sent out a surveying expedition to Hudson's Bay, which, during the winter, travelled over 1200 miles, and made a complete survey of the line, showing its practicability. The expedition returned in the spring of 1886, and brought back the remains of its baggage upon a sledge, which was exhibited with the dogs in the Colonial Exhibition. The dogs, after doing their faithful work, were killed and stuffed. The distance from Liverpool to Port Nelson was practically the same as to Montreal and New York. All the eastern part of Canada was well provided with railways and a magnificent inland navigation. Manitoba and the North-west Territory were not in the same favourable position. It was a most fertile prairie land, 900 miles in width, between Winnipeg and the Rocky Mountains. But that district was cut off from the rest of Canada by a sterile region between Winnipeg and Lake Superior, until the Canadian Pacific railway was made. The people in Manitoba and the North-west Territory had to look for a market for their corn, and they naturally looked to Great Britain. At the present low price of wheat it was impossible for them to sell it in England unless it could be transported cheaply, and it was a matter of notoriety that the cheapest way of transporting corn was by water. The Hudson's Bay railway would be but 300 miles in length. That would not reach to Winnipeg, but it would run over the region between Lake Winnipeg and Hudson's Bay, and then the inland navigation, which had been used for two centuries by the Hudson's Bay Company, would be available for the export of corn from Manitoba. All the investigations which had been made by the Canadian

* The following are compiled from the ice records kept at two stations on the shore of the strait:—September and October 1884: ice heavy and close packed in strait, 27 days; ice heavy and a little water in strait, 23 days; foggy, 5 days; strong gales and snow, 5 days. Four months, June, July, August, and October 1885, three stations: ice heavy and close packed, 98 days; ice heavy and a little water seen, 54 days; foggy 6 days; dense fog, 1 day. Two months, June and July 1886, at three stations: ice heavy and close, 43 days; ice heavy and some water, 42 days; foggy, 5 days; strong gale or hurricanes, 2 days; strong gale with thick snow, 1 day.

Government in the last three years, and all that Commodore Markham had said in the paper went to confirm what was written by a Committee of the Canadian Parliament in 1884:—"For more than 250 years sailors have counted upon having uninterrupted navigation of from two and a half, to three months, and this without modern charts, without an accurate knowledge of these waters, without lighthouses, without a system of telegraphic communication, and without the aid of steam."

Mr. C. S. DRUMMOND said that both Sir Charles Tupper and Mr. Shelford had omitted one point which would probably dispose of the objection raised by Dr. Rae. It was not necessary at present to build a line 700 miles long. Some 275 miles would bring the inland waters in connection with Hudson's Bay. The capital for that would necessarily be small, and the short period that the navigation was open would be sufficient to enable the railway to earn interest on its bonds and dividends on its stock. He was disposed to think that the average of that period would be three months. He had carefully estimated the cost of a railway, and he was convinced that even two and a half months of open navigation would permit of its becoming a paying investment. He had had a great deal to do with Hudson's Bay officers, and he knew that their statements might always be taken without question. Still they were not infallible. They were liable to make mistakes like other persons. In 1880, at Winnipeg, the Chief Commissioner of the Company said to him, "You will never succeed, commercially, in growing wheat in Manitoba." Up to that time vast areas were covered with water until late in the summer, the result of the early June rains and the melting of the ice from the previous winter. However, the Government constructed drains, the water is carried off, and there is now no difficulty in growing the finest wheat in the world. On Lake Winnipeg this year a steamer was crushed, but in a few hours another steamer took its place, and the trade navigation was not interfered with.

The Exploration and Survey of the Little Andamans.

By MAURICE PORTMAN, Esq.

(Read at the Evening Meeting, January 30th, 1888.)

Map, p. 612.

I WILL commence by giving a short general account of the Andamans group before proceeding to describe the Little Andaman Island in detail.

The Andamans are a group of islands situated in the Bay of Bengal, between the 10th and 14th parallels of N. lat., and on the meridian of 93° E. long. The group are composed of the Great and Little Andamans, the former being subdivided into the North, Middle, and South Andamans, Interview Island, Landfall Island, the Archipelago Islands, Rutland Island, and the North Sentinel Island; there are also about 150 small islands.

The Great Andaman is about 140 miles long, and at the greatest width 18 miles across; it is covered with a dense jungle, and is a hilly country, ranges of mountains running the whole length of the island, of which the principal peaks are—Saddle Peak, 2400 feet, in the North Andaman; Puluga-laka-bang, and Boron-tang-da, each about 1600 feet, in the Middle

Andaman; Mount Koyob, 1500 feet, Mount Harriett, 1296 feet, in the South Andaman; and Ford's Peak, 1400 feet, on Rutland Island.

The climate is hot and damp, the thermometer ranging from 72° to 96°, and the rainfall averages about 150 inches. The islands are very unhealthy, owing to the malaria rising from the numerous mangrove swamps and creeks with which they are intersected.

When I was first appointed to the Andamans in February 1879, very little was known of the country north of the Middle Straits, and on receiving charge of the Andamanese in July of the same year, I worked until December 1880 in the North and Middle Andaman. The Survey of India have since that time had the whole of these islands mapped by a topographical party under Captain Hobday, and the only point I should like to draw your attention to, is that of the valuable harbours in these islands. Situated as they are, they form admirable places of refuge during cyclones (which indeed the islands are accused of engendering), and from inquiries held on wrecks occurring at the Andamans, I find that the mercantile marine appear to be very ignorant of this. Port Cornwallis, on the east coast of the North Andaman, is a magnificent harbour, affording shelter in either monsoon; Stewart's Sound, on the east coast, is nearly as good. Port Blair, where the Penal Settlement is, on the east coast, South Andaman, is also a very fine harbour. Macpherson's Straits and Portman Harbour on the east; Port Mouat on the west, a fine harbour, but difficult of entrance owing to reefs, and Port Campbell are all good places of shelter; Kwangtung Harbour, though small, is quite land-locked, and would afford good shelter.*

The Andaman aborigines are to scientific men the great feature of interest. They are a Negrito race, supposed to be the original inhabitants, and allied to the Negrito races of the Malay Peninsula. The people of the Great Andaman are fully described in Mr. Man's work, 'On the Aboriginal Inhabitants of the Andaman Islands,' and I will therefore pass on to the real subject of my paper, the Little Andaman Island.

Beyond the bare fact of its existence, and of its being peopled by savages similar to those of the other Andaman Islands, we seem to have known nothing of the Little Andaman until 1867, when, the savages having attacked and murdered some of the crew of a ship which touched there for wood, a punitive expedition under Lieutenant Much was sent there. They landed on the south coast, and had some fighting with the savages, which can only have resulted in making them more hostile. The next visit was a conciliatory one, paid by General Sir Donald Stewart in 1873, who, after landing presents in Jackson Creek, was attacked. A slight skirmish ensued, in which a wounded savage was captured. He died shortly after being brought on board the steamer.

* The depth of water in these harbours averages 8 fathoms, and is thus sufficient for vessels of any draught.

Then followed the expedition under Captain Wimberley, which was a punitive one, the savages at Hut Bay having massacred some Burmese sailors who landed for water. On this occasion the savages received a severe lesson. After this the island appears to have remained unvisited until 1880.

On the North Sentinel Island, on Rutland Island, and in the jungles south and west of Port Blair, tribes of Andamanese exist who, at war with all mankind, are supposed from the similitude of their weapons and utensils to be offshoots of the Little Andaman tribes. They, in common with the Little Andaman tribes, passed as Járawas, a name given them in the early days of the settlement. I made every endeavour to establish friendly relations with these tribes, both in the hope of being able to approach the Little Andaman people with their assistance, and in the case of the tribes residing in the jungle near the penal settlement, to break them of their habit of shooting all the convicts and others they met; yet, although I have lived in their jungles and had some of them living in my house, I seemed to make no impression on them, and the Chief Commissioner, Colonel T. Cadell, v.c., and I had to content ourselves with frequent conciliatory visits to the Little Andaman, when, although we placed presents on the shore, we were invariably attacked. The landing all round the island is difficult, owing to the surf, and the savages showed much cunning in allowing us to land and deposit presents, and then trying to cut us off on our return to the boats. No hostile steps were taken on our part. This policy of visiting the island and leaving presents was continued at intervals until the 13th January, 1885, when, after rowing up Jackson Creek, Colonel Cadell's party was attacked by a number of savages. A slight skirmish ensued, and an unwounded man was taken prisoner. He afterwards died, in Port Blair, of pneumonia. From Jackson Creek we went to Hut Bay, where another skirmish took place, and it was evident that all the savages were thoroughly hostile.

On the way back to Port Blair we stopped at the Cinque Islands, and found there a party of Malays collecting edible birds'-nests, who said a large party of Járawas were on the island, and were hostile. I went to Port Blair to collect some men, and then returned to the island. After a fight, in which I lost one man, twenty-four of the Járawas were captured, of whom nine were kept and brought to Port Blair, the rest being released. Of these one died in hospital and the remainder were kept in my house, where I endeavoured to conciliate them. I had supposed they were of the Rutland Island tribe, but on taking them round in the station steamer found that they were Little Andaman people, who had come up to the Cinque Islands for turtle. Two men and two women were released in the Little Andaman in 1885. They were loaded with presents and had been well treated. Three men, Tómiti, Tálai, and Kógio-Kai, by name, and a small boy named Eketi, remained with

me until November 1885, when they were also released in Bumila Creek. I had succeeded in attaching them to me thoroughly and learning a little of their language, and it is in my opinion, entirely owing to the affection borne me by these people and by their agency, that I have at last been able to establish friendly relations with the Öngés, as the inhabitants of the Little Andaman call themselves.

The island was visited at intervals after this, and presents were left, but none of the Öngés were met with. In March 1886 Colonel Cadell despatched me alone, in the steamer *Ross* (a small yacht 102 feet in length), to the Little Andaman, as it was thought I might be able, by my personal influence over Tómiti and the others, to enter on friendly relations with some of the people. At Eketi Bay, where I first went, I was threatened by the Öngés, who were, however, quite willing to take my presents; but, after spending a few days in Bumila Creek, the three men, Tómiti, Tálai, and Kógio-Kai, came out from the jungle opposite my boat, accompanied by about a dozen others, and asked for presents, assuring me that they would not fire. I at once went ashore alone amongst them, and gave them presents, and after a few days was on very good terms with the neighbouring people. Captain Hobday, having by this time finished the survey of the Great Andaman, was anxious to connect the Little Andaman by triangulation, and thus fix its position. I remained, therefore, on the island nearly the whole of March, and my influence had by that time extended sufficiently to enable the survey party, in April, to connect the island with the Great Andaman, and to survey the coast-line from Titaijé to Pálálákwé. The island was found to be placed on the marine chart seven miles north of its true position, and it was considered necessary that a coast-line survey of it should be made; so I was sent there again on the 27th October, 1886, with instructions to explore the entire island, conciliate all the savages on it, and to remain there for three months. Should I not even then consider it safe for the survey party to go there, I was directed to survey it myself. I made Bumila Creek my headquarters, forming a small clearing and camp on the east bank. I anchored the steamer *Ross*, which had been again lent to me, at the mouth of the creek, opposite the camp. The Öngés from the neighbouring huts came to visit me, and I made some short excursions to the nearer villages. Very stormy weather began just after my arrival, much retarding my work, and I was unable to proceed farther than Tókyui. On the 15th November a cyclone set in, which lasted till the 20th. The outlying reefs broke the force of the sea, and the *Ross* was not much damaged, but for three days I was unable to get ashore to my camp, and—well, any one who has been through a cyclone in the Bay of Bengal, in a steam-yacht 100 feet long, can appreciate the situation. When I did get ashore, I found all the party had suffered very much. The clearing had been 18 inches under water, and the people were living on matchans; much damage

had been done, and it was dangerous to move in the jungle owing to the falling trees. Many birds had been killed, and quantities of dead fish were washed up on the beach. The Öngés came in to my camp for food, and seemed to have suffered much from the gale; several sick I had seen at Tókyui on the 13th had died. After this storm the place seemed to become unhealthy, and there was a great deal of sickness amongst my party, though I did not suffer much myself till January.

The survey was now commenced by me, as I was uncertain what reception the people might give to the Topographical Survey party should they come. I worked from the north point of the island, that being the point of its connection by triangulation with the Great Andaman, along the west coast. Bumila Creek is short, and blocked by reefs about half-a-mile from its mouth, so nothing larger than a rowing boat could go up. At Tókyui I found the people very friendly, and some caves exist there, in which edible birds'-nests are found. Jackson Creek, though large, with two big branches, is so blocked by a deposit of sand at the mouth, that it is difficult for even a boat to enter in rough weather. The land rises to the south of this, and landing became more and more difficult. The Öngés at Eluba Gölögé were by no means pleasant, and at Api Island I had to stop, and commence again at the north point, working eastwards. The north and north-east creeks are each about three miles in length, and are blocked at the mouth by sand and coral. The people at Titaijé and Támbe-ébui (Tomiti's village) received me most cordially, and accompanied me along the coast. Téyai Creek, though the most beautiful and the largest in the island, is also blocked at the mouth by sand. At Toi-bálówé I met the women whom I had captured in 1885. They seemed delighted to see me. The people at the south-west are not as pleasant as the others; but I was able to keep the peace with them. I managed to close the survey on Api Island successfully on the 7th January, 1887, and, after waiting ten days more to firmly cement the friendship I had made in the different villages, returned to Port Blair. I was accompanied throughout by my three friends, who had taught me a little of their language, which differs from the languages of the inhabitants of the Great Andaman, and on two occasions made trips to Port Blair, taking up parties of Öngés to see the Settlement.

At the north end the island consists of mangrove swamp, and low belts of sandy soil, on which the aborigines have their huts. On the west and south-west the land rises into low hills of a coarse sandstone, running more or less north and south. The timber appears to be much the same as that of the South Andaman, though I saw no padouk, and very few bamboos. The rocks are chiefly lime and sandstone, with a good deal of actual coral rock on the east and south coasts. In one place, south of Daogulé Bay, I noticed an outcrop of igneous rock. I found no minerals of importance. The island is about 27 miles long by

15 miles broad, and is encircled by a fringing coral reef. The products of the sea are the same as at the Great Andaman; but the Tubiporine family of coral, particularly *Tubipora musica*, occur in profusion. Dugong and turtle are very plentiful. On the South Sentinel Island, about 12 miles west of the Little Andaman, the turtle appear to have their breeding station. This island, which is composed entirely of coral rock, is infested by large iguanas, and the *Birgus latro*, or coco-nut-stealing crab (who certainly does not live on coco-nuts there, as there are none). In rough weather landing is almost impossible on the coast of the Little Andaman, and even in fine weather there are heavy ground-swells and tide-rips. On the north coast large isolated reefs and ledges exist, which make navigation dangerous; and as it is not probable, owing to the want of good anchorage, and the general valuelessness of the island, that we shall ever occupy it, all that remains to be done there, now that its position is determined, and its coast-line accurately laid down, is to keep the Öngés from murdering shipwrecked crews who may be cast away there, and teach them to treat outsiders in a friendly manner, which can, I think, be accomplished in time without much difficulty.

With regard to the aborigines of the island, I am of opinion that the whole of the Little Andaman Island is peopled by one race, calling themselves Öngés. These people are subdivided into tribes, who adhere more or less to their own villages, and who quarrel and fight with each other considerably. They appear healthy, their principal diseases being chest complaints, colds, fever, and itch. In physique they compare favourably with the inhabitants of the Great Andaman. Their manners and customs differ somewhat from those of the Great Andaman people, the principal differences I have noticed being the following:—

Instead of small lean-to's, they build large circular huts, some measuring as much as 35 feet in height and 60 feet in diameter. In these huts the various families sleep, on charpoys of wood and cane matting, raised from 6 inches to 18 inches off the ground, and about 2 feet 6 inches square. Their habits are more cleanly, particularly as regards their huts and the manner of preparing their food, which is invariably cooked. They cook, dry, and store in baskets a small fish like a sprat, and this, with the boiled seed of the mangrove, seems to be their principal food, which they supplement with what they can. Their canoes, utensils, ornaments, and bows are different from those of other Andamanese, and the women wear a tassel of yellow fibre in place of the leaf. They do not smear their bodies over with red ochre, or tattoo themselves, nor do the women keep their heads clean-shaved. They are by no means expert in the use of a canoe in rough water, and do not harpoon turtle or dugong, though very fond of the former. They have no religion of any kind, and I have learnt nothing of their traditions or superstitions, from which they seem even more free than their neighbours.

With regard to their behaviour to shipwrecked crews, I am of opinion that the crew of any native vessel wrecked there would still be liable to be massacred, and though a European, if wrecked on the north coast, *might* be well treated, I should not like to guarantee his safety. Shipwrecked sailors are rarely diplomats, and would be extremely liable to resent the looting of their ships or persons in a manner which would certainly lead to their being killed. This looting cannot be prevented, the temptation being too great for any savage, however tame, and the general education of the Öngés will take some years.

On the 4th March, 1887, the island was visited by the Chief Commissioner and Colonel Strahan, in charge of a survey party, with a view to correcting my survey and fixing the north and south points of the island by observation. This was successfully done, and my map having been approved was handed over to the survey party, and will be produced by that department of the Government of India with the other maps of the islands. During this visit an incident occurred which exactly illustrates the temper of the savages. On the morning of the 9th of March an assistant-surveyor, with a party, attended by some Andamanese, the three interpreters, and two canoes full of presents, had landed at Ingoie, and proceeded to survey the coast to Ingo-tijálu. Unfortunately the canoes were swamped in the surf, and the presents all lost; but the Öngés, though disappointed at getting nothing, were fairly agreeable. At 4 p.m. the surveyor came off to the station steamer *Kwangtung*, which was anchored off Ingo-tijálu. At 5 p.m. I landed, accompanied by the commander of the *Kwangtung*, the chief engineer, Mr. Murray, and Colonel Roberts of the Madras Staff Corps. Only three Andamanese were with me, and I had no presents. We were received by about twenty-five people, including women and children, all of whom, with the exception of two men, who had adzes in their belts, were unarmed. We walked along the shore together amicably, when the officers stopped to look at some fish, leaving me talking to the Öngés a little way behind. Suddenly I heard a thud, and Mr. Murray cried out, "I am killed." I turned and saw him on his knees on the sand, the blood streaming from a wound on the back of his head, and a tall Öngé standing just behind him with a large adze in his hand. The attack was quite an unprovoked one, and from the fact that the women and children were present, and none of the other Öngés were armed, I consider it to have been unpremeditated, and without the approval of the others, who immediately began to retire. The man was probably out of temper at receiving no presents. Kogio-Kai, who was with me, called to me to shoot the Öngé, but none of us had any arms, and we returned to the boat and took Mr. Murray on board the *Kwangtung* for treatment. I then armed all the Europeans, and took them ashore in two boats, Colonel Roberts being in charge of the armed party. As my object was not to fight, but to secure the offender, I took with me Tómiti

Tálai, and Kogio-Kai, who landed in the surf and went up to the Öngés who were sitting on the beach. Tómiti, after a few moments' conversation with them, went up to the man, snatched the adze from his belt, and with Tálai's help secured him and brought him off to the boat. He was taken on board the *Kwangtung*, and brought up to Port Blair for punishment.

I am glad to say Mr. Murray recovered from his wound, which was a very serious one. The behaviour of Tómiti and Tálai in arresting their own countryman was beyond all praise.

There are one or two points on which I should like to say a few words, one of which is the derivation of the word "Andaman." The Andaman Islands have been known to the Malays for certainly over three hundred years, and they, with the Arabs, have been in the habit of visiting them for edible birds'-nests, trepang, and slaves. I found that the Malays had names for the principal harbours, and claim to have given the name Andaman. While at Penang in 1885 with some Andamanese, I met Mr. W. Maxwell, a well-known Malay scholar, who told me that the Malays looked on the Andamanese as the monkey race mentioned in the *Ramáyana*, and had for long known them as "Orang Hándoumán" (as they pronounce the word Hánouman), the islands being known as the "Handoumáns." Hamilton in the 17th century mentions the Andamanese as slaves in Penang, and also tells curious stories of their journeying to the Nicobars for plunder or trade. To any one who knows anything of these people, their canoes, and their dread of even going out of sight of land, these stories appear sufficiently absurd, as is another tale of their bringing quicksilver from the Little Andaman. I have carefully searched in this island and in the Great Andaman for minerals, and found no trace of quicksilver ore anywhere, nor did the savages know it when it was shown to them. I identify the islands with the Buzacatas or Aginates of Claudius Ptolemy, A.D. 127; but at what date they assumed the name Andaman I am unable to say. I should also like, if it is not considered presumptuous, to express my admiration at the manner in which the Topographical Survey of the Andamans under Captain Hobday was conducted. Of the survey itself I am not competent to give an opinion, so will just say that I have heard it described as one of the finest pieces of pure jungle-surveying which has been done. As officer in charge of the aborigines, I was apprehensive of difficulty with the savages, but nothing could exceed the tact and good temper with which Captain Hobday and his assistants treated them. Taking into consideration the continued exposure in the malarious jungles, the sickness they suffered, the torments of leeches in the wet weather, and the swarms of ticks, each bite leaving a nasty sore, in the dry weather, surely it would have been scarcely to be wondered at if they had lost their tempers, but on no occasion did they come into conflict with the savages, or indeed with any one else, with whom they had to deal; and

not only that, but they in many instances gained the friendship of savages they had met.

And now, in conclusion, one word in favour of the savages with whom I have been for so many years associated. I have often heard them described as coal-black dwarfs, very treacherous and ferocious, cannibals, and quite without redeeming qualities. I don't deny that they are coal-black, because they are probably the most intensely black race in the world. As their average height is a little over five feet, I should scarcely call them dwarfs. I have never found them treacherous, and ferocious they are certainly not. Cannibals they never were, I believe, and my belief is supported both by all facts since 1858, when the Penal Settlement was opened, by their assertions, and declared abhorrence of the custom, and by the extreme improbability of any race, which can procure so much, and such varied food, both from the sea and land, in profusion, and with ease, ever taking to cannibalism. As to their having no redeeming qualities, they have very few bad qualities. Like all savages they have short memories, and quick tempers, and their emotions are short-lived, but it is rather by their behaviour to each other than by their reception of outsiders, that we should judge them. Small wonder, after the way the Malays and Arabs used to kidnap them for slaves, that they hated all outsiders, and revenged themselves on any unfortunate who was cast away on their island. Among themselves they are most gentle and good-natured; holding most things as common property, theft is almost unknown, and towards each other they seldom lie. With a strict monogamic system of marriage, infidelity and all attendant crimes were very rare. Being so low in the scale of civilisation, none of the vices of civilisation are known to them. They always treat well those who behave well to them, and as they have been strictly looked after by the local government, they look on all white men as friends. They are charming companions in the jungle, full of life and fun, quite ready to see the comic side of everything, and always cheerful and good-tempered. They pass their lives in hunting or dancing, their few wants being easily satisfied. Many of the men are very good-looking, as they have none of the thick lips, high cheek-bones, and flat noses of the negro type; though the women are rather of the Hottentot Venus order of beauty. It was indeed an evil day for the race when the Penal Settlement at Port Blair was established, and, through the convicts, disease crept in amongst them. Their association with outsiders has brought them nothing but harm, and it is a matter of great regret to me that such a pleasant race are so rapidly becoming extinct. We could better spare many another.

Before the paper,

The CHAIRMAN (Sir Rutherford Alcock), in introducing Mr. Portman, said that his paper dealt with explorations and surveys in an island previously almost unknown. The Andamans were chiefly associated in the memory of English-

men with the assassination of Earl Mayo, but very little was known about the most southern island of the group, called Little Andaman. The Society was always glad to welcome any well-certified facts about a new country, for they never knew what might be the result. Cook made his celebrated voyage for the purpose of observing the transit of Venus, and that voyage led to the colonisation of Australia, New Zealand, and Tasmania.

After the paper,

Professor FLOWER (Director of the Natural History Museum) said that he had never had the privilege of seeing an Andaman islander alive, but he had examined many of their bones and skulls, so that he knew something about their size, their proportions, and their physical relations to other races. It was most remarkable that Little Andaman, which was, roughly speaking, about the size of the Isle of Wight, was, until Mr. Portman visited it in 1880, as isolated from the civilised world as any region could be. The natives had lived there for thousands of years without any communication with the outer world except with the unfortunate shipwrecked crews that had been cast upon their shores, whom they appeared to have invariably murdered. One of the greatest privileges a geographer and anthropologist could have at the present day was to be brought into peaceful contact with such a race, and to be able to lift up the veil behind which they had been so long concealed. There were many details about the Andamanese, their appearance, size, colour, habits, mode of life, &c., that he hoped Mr. Portman would make known at some future time. It was most important that that information should be given as early as possible, because in a few years the habits of the natives would be entirely changed, and before long the race would be exterminated. That result was going on very rapidly in the Great Andaman Islands. The presence of 12,000 convicts from the mainland of India must produce changes among the natives. The Andamanese were a particularly interesting race to the anthropologist, because they seemed to be the purest examples still remaining of one of the large branches of the human race which, according to the modern view, was at one time widely spread over the southern portion of India, the Malay Peninsula, the Indian Archipelago, and New Guinea. They were a race of small people with frizzly hair and dark complexions, differing in their features and form of skull from the African negroes. A good deal of the evidence of the existence of this negroid race over India was rather vague, but the theory was that they were the original population; that they had been superseded by Caucasian and Malay races; that traces of them were to be found here and there in some of the remoter parts of India, and that their influence accounted for the black complexions and woolly hair occasionally found in Southern Asia and in the Philippine and other neighbouring islands. Only in the Andaman Islands were these people still found perfectly pure, without any admixture whatever. These islands were therefore of great interest to anthropologists, and all information about the natives of them was of very great value.

The CHAIRMAN said they were all indebted to Mr. Portman for bringing before them the most recent information about the negroid race. It did not appear that this race gained anything by civilisation. Not only were they becoming exterminated, but they had caught everything of evil which was likely to come from people who had more vices than themselves. Admiral Mayne's summary account of the explorations made in the last five years by the British North Borneo Company's officers had been suggested at the last meeting by the President after hearing an interesting account from Mr. Daly of the explorations he had personally conducted into the wholly unknown interior of this great territory. We had much to learn yet of this *terra incognita*, but were much indebted to Admiral Mayne for his very clear exposition of the progress actually made.

The Hydrography of South-Eastern Tibet.

By General J. T. WALKER, C.B., F.R.S., LL.D.

Maps, p. 612.

THE 'Proceedings' of the Royal Geographical Society for June 1887 contain a paper which I had the honour of reading before the Society, entitled, "The Lu River of Tibet; is it the source of the Irawadi or the Salwin?" A considerable portion of the paper is devoted to a discussion of the several links of the chain of evidence which establishes the fact that the Lohit Brahmaputra rises about the 29° parallel of latitude, on the western border of the basin of the Lu, and flows westwards into Assam. The one link in the chain which had been at all doubtful was that which lay across a belt of hills on the eastern border of Assam occupied by semi-savage tribes of Mishmis and Miris, which has not even to this day been traversed by any of the employés of the Indian Survey. But the doubts regarding that link had just been dispelled by Mr. Needham, a political officer in Assam, who had travelled up the Lohit Brahmaputra, through the Mishmi Hills, into the Zayul district of Tibet, and had found that the rivers of that district were the sources of the Lohit. Thus, it is evident that no Tibetan river west of the Lu can possibly be the source of the Irawadi. Such being the case, it appeared to me that the time-honoured tradition that the Lu is the source of the Salwin might be erroneous, and I endeavoured to show that it is more probably the source of the Irawadi. That, however, is still an open question; but there is no longer any reason to doubt that the Lohit Brahmaputra receives all the southern waters of the Tibetan tracts which lie immediately to the west of the basin of the Lu, arrests their southern progress, and conveys them westwards into India.

Shortly after the publication of my paper, the Geographical Society of Paris published—in the Bulletins for the second and third quarters of 1887—a Memoir on the Geography of Eastern Tibet by Mons. J. L. Dutreuil de Rhins, which, however, had been written in the autumn of the previous year, apparently in ignorance of Mr. Needham's adventurous journey and its valuable geographical results. The author makes an elaborate examination of D'Anville's map of Tibet, and discusses the information regarding the hydrography which is furnished by Chinese writers; he gives five maps, of which the first is a reproduction of D'Anville with a few additions, and the last a general map of his own compilation from a variety of sources, D'Anville, Klapproth, Pandits Nain Singh and Krishna (A—k), the well-known Trans-Himalayan explorers of the Indian Survey, the French Jesuits in Tibet and Western China, and Mr. Robert Gordon. He repudiates the theory held by Klapproth and Mr. Gordon that the Yaro-tsanpo river—sometimes called the Chang Chu, but more commonly the Great Sangpo, and by

D'Anville the Yœrou Dzang bo tohou—is the source of the Irawadi, and he criticises Klaproth with merciless severity; on the other hand, he expresses a very favourable opinion of D'Anville.* He is, however, as firmly persuaded as was Klaproth that the sources of the Irawadi river lie in Tibet, to the west of the basin of the Lu. He finds in D'Anville's map a river called the Kenpou or Gakbo, which is represented as rising in Central Tibet and flowing southwards between the Yaro-tsanpo and the Lu; also a cluster of minor rivers flowing southward between the Kenpou and the Lu; he maintains the former to be the principal and the latter the minor sources of the Irawadi. All this, however, we now know with absolute certainty to be impossible.

Mons. Dutreuil de Rhins, though mistaken on these very important points, has yet done service to geography by bringing the Kenpou-Gakbo into more prominent notice; for though it assuredly does not rise in Central Tibet, and its course is shorter than is represented in D'Anville's map, it is almost certainly a large river, draining a considerable portion of that extensive but little known region which has hitherto been regarded as constituting the eastern basin of the Yaro-tsanpo. I will presently show that it is most probably the source of the Dibong river of Upper Assam, as the Yaro-tsanpo is of the Dihong river, and therefore that, as the Dibong flows into the Dihong, the Kenpou is virtually an affluent of the Yaro-tsanpo.

But first I would draw attention to the recent account of the lower course of the Yaro-tsanpo, by Colonel Tanner, which is published in the 'General Report of the Survey of India for 1886-7,' and has already been noticed in the Presidential Address recently delivered by General Strachey. Colonel Tanner says that K. P., a native of Sikkim, who had accompanied the explorer G. M. N. to Gia-la-Sindong, on the Yaro-tsanpo, about 100 miles from the plains of Assam, was despatched by Captain Harman in 1880, as an assistant to a Chinese lama, who had undertaken to follow the river down to the plains, or, failing that, to throw

* "*Appréciation sur les cartes de d'Anville et de Klaproth.*—Arrivés au terme de notre interprétation de la carte de d'Anville, nous exprimerons encore l'admiration que nous avons éprouvée en voyant le parti qu'il a su tirer des croquis des Lama. Ces croquis des Lama, nous ne les avons pas vus; mais comme on les devine bien, comme on les reconstruirait morceau par morceau quand on a étudié la carte de d'Anville, dont les erreurs ne proviennent que du manque de points de repère et de renseignements. Sans doute nos deux cartes sont bien différentes; mais comme ces différences s'expliquent bien en tenant compte de ce qui faisait défaut à l'époque de d'Anville.

"Prenons au contraire les cartes de Klaproth,—qu'on se rassure, je ne ferai pas perdre au lecteur le temps que j'ai mis à les étudier,—et il nous sera impossible d'expliquer ses erreurs aussi nombreuses que ses coups de crayon; parce qu'il n'empruntait aux documents que ce qui convenait à son imagination, parce qu'il n'obéissait à aucun principe, à aucune règle d'interprétation mathématique, et ne songeait pas à critiquer son propre travail, fruit de la fantaisie et d'un raisonnement superficiel. Mais, quelque mauvais que soit l'usage qu'il fait de la géographie chinoise et des itinéraires chinois, n'oublions pas les services qu'il a rendus en les traduisant."

marked logs into it, with a view to their floating down the river and being picked up and recognised on entering the plains. The two men reached the Pemakoi country below Gia-la-Sindong; the lama then treacherously sold K. P. as a slave, and decamped to his home in China. While detained in the Pemakoi country, K. P. managed to descend the river to a point near the Abor village of Miri Padam, which, he was told, was some three days' journey from the plains of Assam; there he was stopped, because travellers from the Tibetan side are not allowed to proceed further down the river. During his captivity, of some years' duration, he acquired a good deal of information about the river for about two-thirds of the distance intervening between Gia-la-Sindong and the plains. Of course he had no surveying instruments and could not keep written memoranda; but he was sufficiently long in the country for the broad facts of distances and general directions to become well impressed on his memory, and this has enabled Colonel Tanner to compile a fairly reliable map. A copy, much reduced in scale, is herewith given as No. 1 of a series of four maps illustrating the hydrography of South-Eastern Tibet; No. 2 is from M. Dutreuil de Rhins' reproduction of D'Anville, with a few additions; No. 3 is from the map constructed by M. Dutreuil de Rhins to supersede D'Anville's; and No. 4 is my own compilation. In No. 2 and No. 3 Greenwich has been adopted as the origin of longitudes instead of Paris, otherwise the maps are exact reproductions of the originals, but on a smaller scale.

The northern and eastern details of No. 1 are taken from the map which was prepared to illustrate the explorations of Pandit A—k,* and was constructed entirely from the field-books of the Pandit; it shows his route and gives the topographical details which he actually saw and recorded, and what he obtained from native information, distinguishing the latter by dotted lines. The explorer had never heard of Klaproth or D'Anville, and knew nothing of the maps of the Lamas or the writings of the Chinese geographers; every region he traversed was to him absolutely *terra incognita*. His route was laid down by paced distances and magnetic bearings, checked from time to time by astronomical determinations of latitude, but not longitude, which were too difficult for him.

D'Anville's map—published in 1733—was compiled from surveys executed some years previously, by lamas of Tibet, under instructions from the Jesuit fathers who surveyed China for the Emperor Kanghi; but the lamas' maps are generally very meagre, and only reliable in the vicinity of the principal roads between Lhasa and Peking; in parts they are very misleading, and must have been compiled at best from rude estimates of distance and direction, and possibly even from mere hearsay

* See 'Report on the Explorations in Great Tibet and Mongolia,' made by A—k in 1879–82, in connection with the Trigonometrical Branch, Survey of India, prepared by J. B. N. Hennessey, Esq., M.A., F.R.S. Dehra Dun, 1884.

or conjecture. A sufficient agreement between maps 1 and 2 in the belt of country about the parallel of Lhasa may be found to establish a general identity; thus the Tchamta of No. 2 is identical with the Pandit's Giamda; the lake Djamna-mtso with Aroha-cho; the village Lhari with Lharugo; the towns Choupatou, Lhoroundzong, and Paczong with Shiobado, Lho-jong, and Pashu Jong; the bridge Kia-yu-kiao with Shang-ye-Jam; and the river Souk-tchou with the Giama-Nu-Chu. South-eastwards, the lake Am-dso of No. 2, near a north-and-south waterparting, is probably identical with the Pandit's unnamed lake in the Nagong district, immediately to the north of the Ata-gang-la Pass over the Himalayas; and in this quarter there are two more towns which are certainly identical, though very differently placed, viz. Tsatsorgong with Dayul, and Tehoudzoung, or Sangyak-tehoui-dzong, with Sanga-Chu-Jong. But to the east of the Yaro-tsanpo several towns and a large river—the Kenpou or Gakbo-dzangbo-tchou—are met with which do not appear on the Pandit's map, because they occur in a region which lay at a considerable distance from his route, and is shown as a blank on his map, with a river dotted across it as flowing westwards from the lake in the Nagong district into the "Chang-chu, or Great Sangpo."

It is to be remembered that the officers of the Indian Survey always restrict the maps of the explorations, as closely as possible, to the actual facts which were observed by the explorer or communicated to him by the people of the country; no liberties are taken with the mapping beyond what is necessary for adjusting the route surveys to the astronomical latitudes and closing any circuits. In this way each man's work is presented to the public as an independent contribution to geography, available for future comparison and combination with the work of other men. The great blank in the Pandit's map was left for this reason, and the question now arises to what extent it may be legitimately filled in with details taken from the Tibetan and Chinese geographers. I made a small move in this direction when the map illustrating my paper on the Lu river was being compiled, and introduced the Kenpou river into it as rising in the hills south of the road between Lharugo and Lho-jong, and being joined by the Nagong river, the united stream then flowing towards the Yaro-tsanpo, and joining it at a point considerably higher than the junction shown in the Pandit's map. This rendering then seemed to be most in accordance with the information obtained from various Mishmis and Abors who inhabit the mountain ranges on the northern borders of Assam; according to them,* a river called the Kala-pani, or Blackwater, flows westwards into the Dihong from the snowy ranges in which the Lohit Brahmaputra rises; but the Nagong Chu rises in the same ranges and on the same side of the waterparting as the Kala-pani, and as its name also means black water, we

* See Note 7.—the Eastern Basin of the Yaro-Tsanpo—to my paper on the Lu River.

probably have here one and the same river under different designations; I assumed this to be the case, I still think correctly. But M. Dutreuil de Rhins has convinced me that the Kenpou is a much larger river, and drains a much larger area, than I at first supposed; and though there is now no longer even a shadow of a reason in support of his theory that it is the upper course of the Irawadi, thus diverging widely from the Yaro-tsanpo, there is much reason to accept the gradual convergence of the Tsanpo and Kenpou which is shown by D'Anville, and leads irresistibly to the conclusion that the Kenpou is the source of the Dibong river of Assam, which joins the Yaro-tsanpo-Dihong a little below Sadiya, and is known to have a considerable volume.

Colonel Yule discusses this very question at page [75] of the Geographical Introduction to Baker's condensed edition of Gill's 'River of Golden Sand' (London, 1883); but he concludes that the "Dibong, in spite of its large discharge, does *not* come from Tibet," because Colonel Woodthorpe—who ascended it to the highest point yet reached by any European—"considered himself to have derived, from extensive views, and native information in connection with them, 'a fairly accurate knowledge of the sources of the Dibong, and the course of its main stream in the hills'; and in the map representing this knowledge the river is indicated as having no source further north than about 28° 52'." I have, however, had a recent opportunity of conversing with Colonel Woodthorpe on the subject, and he admits that he cannot positively claim to have seen the actual sources of the river, which, he says, may be far more distant than he was led at the time to imagine.

There is no direct evidence on the identity of the Kenpou with the Dibong that I am aware of, but there is strong evidence that the Dibong must drain an area considerably greater than the basin hitherto assigned to it in the southern spurs of the Himalayas. The discharges of the four most notable rivers of Upper Assam—the Dibong, the Dihong, the Lohit, and the Subansiri—have been twice measured, the two first by Bedford, and the two last by Wilcox, in 1825, and all four by Harman in 1878. The results of the first measurements are given in a paper by Colonel Cunningham in the 29th volume of the 'Journal of the Asiatic Society of Bengal,' but no details are given for estimating the reliability of the operations or checking the accuracy of the printed results. Harman's operations are, however, known to have been conducted with great care, and specially with a view to the light they might throw on geographical questions; several surveyors took a share in them, and the means available for measuring the sectional areas and current velocities were probably far superior to what had been available half a century previously; moreover, full details of the operations and calculations are forthcoming in Part II., 'Physical Science,' of vol. xlviii. of the 'Journal of the Asiatic Society of Bengal.'

Harman's discharges are as follows, expressed in cubic feet per second of time :—

	Cubic feet.
Subansiri river, Feb. 25 to 28, 1878, at about lowest	16,945
Brahmaputra at Dibrugarh, March 11 to 18, about lowest	116,115
Combined Dihong and Dibong, one mile below junction and one mile above junction of united stream with Lohit Brahmaputra, March 25 and 26. }	110,011
Correction to reduce to lowest level	27,350
Lowest level	82,652
Dibong, one mile above junction with Dihong, March 27	47,383
Correction to reduce to lowest level	20,181
Lowest level	27,202
Dihong, lowest level = 82,652 - 27,202 =	55,450
Lohit Brahmaputra, 9 miles above Sadiya, April 2 to 6	66,251
Correction to reduce to lowest level	32,419
Lowest level	33,832

The previous results were obtained in December 1825, and are as follows :—

	Cubic feet.		Cubic feet.
Subansiri	16,000	Dihong	56,000
Lohit at Sadiya	19,000	Dibong	13,000

The two first agree very fairly with Harman ; the two last are very much less, but they agree in giving the Dibong a volume at least two-thirds of that of the Lohit. Any way it seems improbable that a river with so large a volume can have the small drainage basin, as compared with the basins of the Lohit and the Subansiri, which has been assigned to the Dibong in Col. Woodthorpe's map, on authority which he now admits to be fallible. Thus, that river most probably rises behind the Himalayas and is the lower course of the Kenpou. Moreover, as in flowing into the Dihong it takes all its affluents with it, we see that the information about the Kala-pani and the Nagong Chu flowing into the Dihong must be quite correct, only it has not been correctly interpreted hitherto.

But the Kenpou river does not rise quite so far to the north as is shown in D'Anville's map, and M. Dutreuil de Rhins' also. For the river passing Lhari, which they assume to be its source, was crossed by Pandit A—k, and he was informed that it joins the Daksong Chu, which he crossed to the east at the village of Alado, and that the united stream is joined further down by the Kongbo Giamda Chu and enters the Yaro-tsanpo about 20 miles above Gia-la-Sindong. At Alado he was

within fifty miles of the notable bend in the great river and not much further from Gia-la-Sindong. Pandit Nain Sing obtained very similar information though at a much greater distance, not less than 150 miles above the bend. To some extent this information is corroborated by explorers G.M.N. and K.P., who actually descended the river, the first for a few miles, the last for over 60 miles, below Gia-la-Sindong; they agree with the two Pandits about the point of junction of the Kongbo Giamdo Chu with the great river, but say that the Lharing-poi river—which is most probably identical with the Lhari river and receives the Daksong—joins the great river a few miles below Gia-la-Sindong, where they saw its mouth. Thus, the rivers flowing from Alado and Lhari can scarcely be sources of the Kenpou, and if they are not, the actual sources probably lie not far to the north of the parallel of 30°. I have shown them accordingly in map No. 4, and drawn the Kenpou as the upper course of the Dibong, and being joined by the Nagong Chu, a little above the point where it enters the Himalayan mountains to make its way across them into Assam.

In conclusion, I quote from M. Dutreuil de Rhins the conflicting evidence of Chinese geographers on Tibetan hydrography, in regard to the lower courses of the Yaro-tsanpo, the Kenpou-Gakbo, and the "Tchod-teng-tchou," which last I believe to be identical with Pandit A—k's Rong-thod-chu, the western branch of the Zayul Chu, the river which is the source of the Lohit Brahmaputra.

"1° Le Yœrou dzang bo tchou (Tsanpo) après avoir passé entre Naidzong et Dzélagang, sort du Thibet par le défilé de Singhian-khial pour entrer dans le pays de H'lokba habité par les Moun. Il traverse ce pays du nord au sud, se dirige en suite au sud-sud-ouest, entre dans l'Inde et va se jeter à la mer.

"1° bis. *Passage différent sur le même fleuve*: du pays de H'lokba le fleuve coule au sud-est, entre dans le Yunnan près de Young tchéou et y devient le Pinlang kiang.

"2° Le Gak bo dzang bo ou Kenpou, après avoir reçu le Bo dzang bo, entre dans le pays de H'lokba habité par les Moun, coule vers le sud-est, entre dans le Yunnan par le nord-ouest, près du fort de Thian than kouan, et y devient le Loung tchouan kiang (rivière Chouely, affluent de l'Iraouady).

"2° bis. *Passage différent sur le même fleuve*: en sortant du pays de H'lokba, le Gak bo coule au sud-est et se réunit au Yœrou dzang bo.

"3° Le Tchod teng tchou ou Tchitom tchou (formés des deux rivières Lo tchou et Man tchou qui coulent au sud) coule également au sud et se réunit au Gak bo dzang bo (Kenpou) dans le pays de H'lokba habité par les Moun.

"3° bis. *Passage différent sur le même fleuve*: ce fleuve coule au sud et entre dans le pays de H'lokba, où il se réunit au Yœrou dzang bo."

We may accept the statements 1°, 2° bis, and 3° bis as approximately

correct, but the opposite statements, with which they respectively conflict, are grossly incorrect. Klaproth adopted the erroneous version in every instance; M. Dutreuil de Rhins has done so in the two last instances, but he has happily avoided the first and most egregious error which Mr. Robert Gordon, as well as Klaproth, found so captivating. D'Anville very wisely stops his rivers when they enter *terra incognita*; thus he does not commit himself to either of the three erroneous versions of Tibetan hydrography.

On the Length of the Persian Farsakh.

By General A. HOUTUM-SCHINDLER, Persian Telegraph Service.

THE cubit was the unit of all the measures of length in Asia,* and is so now in Persia. The Persian cubit was the same as the Babylonian one, and was no doubt adopted in prehistoric times. The Nuzhet el Kulûb (geographical work by Hamdullah Mustoft, about 1340), speaking of the Farsakh,† says that its length was determined by Kai Kôbâd, the first of the Kaianians ("the farsakh was fixed at 12,000 cubits"). We may therefore assume that the Babylonian cubit was introduced into Persia at the same time or before. But Kai Kôbâd, although by some writers considered to be the Dejokes of the Greeks, is a more or less mythical personage.‡ Dejokes flourished about 700 B.C. From measurements on Babylonian ruins, Oppert found that the old Babylonian cubit was equal to 525–530 mm. (20·670 to 20·867 inches). There is on the knees of the statue of the Chaldean King Gudea (about 2600 B.C.), found some years ago by de Sarzec at Tel-loh, a plan of a fortress, and from its scale, the length of the cubit then in use was found to be equal to 540 mm. (21·260 inches), and finally from measurements on the palace of Sargon (721–705 B.C.), at the foot of the Muzri hill, the length of the cubit was found to be equal to 548·5 mm. (21·595 inches).§ There were two kinds of cubits, the *common* and the *royal*, and the latter was three digits longer.|| As the royal cubit had a length of 24 digits, the common cubit was equal to 21 digits, or $\frac{7}{8}$ of a royal cubit. The Greeks calculated the parasang at 10,800 cubits, the Persians at 12,000; the cubits therefore must have been different, for we have instances of different cubits, but there is nothing to show that there were different Farsakhs. It is certain that the Greeks adopted the royal Babylonian cubit of 525 mm. This is proved from the Greek foot, which had a length of about $\frac{2}{3}$ of the Babylonian cubit, varying from 308 to 315 mm. (12·126 to 12·402 inches).¶

* Brandis, 'Münz-, Mass- und Gewichtswesen,' p. 22.

† *Farsakh* is the Arabicised form of the word *pârsang*, explained in dictionaries as pieces of stone placed on the roadside at distances of a farsakh; *pârsang* was transcribed by the Greeks as *παρσαγγης*.

‡ Spiegel, 'Eranische Alterthumskunde,' i. 724–730.

§ Oppert, 'Records of the Past,' vii. 53; xi. 22.

|| Herod., i. 178.

¶ The length of the Greek foot varied from 308 to 315 mm. The Attic (Olympic) foot at the time of Perikles had 308 mm. (12·126 inches), from the temples at Selinus the Greek foot was found to be 310 mm. (12·203 inches), from those at Paestum 314 mm.

It is also certain that 10,800 of these cubits made one parasang, 5670 metres or 3·523 Eng. stat. miles. When we consider that the Persians had probably long before the Greeks adopted the cubit and the parasang from the Babylonians, and that the common cubit was $\frac{2}{3}$ of the royal cubit, and when we find that the twelve-thousandth part of a parasang equals 472·5 mm. (18·605 inches), and is exactly $\frac{2}{3}$ of the old royal cubit of Tel-loh (540 mm.), we may, I think, without going far wrong, conclude that the Persians had adopted the old *common* Babylonian cubit of 472·5 mm. It is only in this way that the Greek and Persian itinerary measures can be made to correspond, and that they did correspond is, I think, certain. The parasang of 5670 m., or 3·523 miles, was therefore the one used by the Persians, the Greeks, and the early Arab geographers, and the stadium of Herodotus, $\frac{1}{30}$ of a parasang, had therefore 189 m. or 620·09 feet.

Many writers calculated the farsakh from the Olympic stadium of 606·315 feet and made it 3·445 miles (5544 m.); but the parasang or farsakh was an old Babylonian measure and was based on the Babylonian cubit, and the stadium of Herodotus should therefore, I think, be calculated from the parasang and not the parasang from the stadia, which were later on used in Greece; and, from what I said above, I can only come to the conclusion that the parasang of 30 stadia or 10,800 cubits, was equal to 5670 m. or 3·523 miles. Later on different cubits came to be introduced in Persia, and with them the length of the parasang varied.

The cubit now in use in Persia varies between 520 and 530 mm. (20·473 and 20·867 inches), and as 12,000 go to the farsakh, the farsakh would vary from 6240 to 6360 metres, or 3·877 to 3·952 miles, giving a mean value of 6300 metres, or 3·915 miles. From this I conclude that the Persians finally adopted the royal Babylonian cubit of 525 mm., for $12,000 \times 525 \text{ mm.} = 6300 \text{ metres}$, or 3·915 miles as before.

The cubit is in Persia called by the Persian name *gez*, meaning originally the measuring stick, and by the Arabic *dharā'* (Hebrew *darā'*). *Dharā'* stands for "the arm from the elbow to the tip of the middle finger;" it is the royal cubit, *πῆχυς βασιλῆως* of Herodotus (i. 178) and was three digits longer than the common cubit. *Dhar'* in Arabic means "measuring with a cubit;" the Persians for "measuring" used the expressions *dhar* (pronounced *zar*) *Kerdan* and *gez Kerdan*. The *gez* now in use is generally understood to be two cubits, and is the same as the old *gez i Shāhigān* (royal yard), half the height of a man of ordinary stature, now also called *gez i shāh*; but in many parts of Persia the *gez* is understood to be only a cubit. The double *gez* is generally called *zar* (*dhar'*), and is equal to 1040 to 1060 mm. (40·946 to 41·734 inches), double the Babylonian cubit of 525 mm. The 'Nuzhet el Kūlūb' speaks of the 24 digit *dharā'* as a *dharā' i Khalki* (popular, common, cubit?) and distinguishes it from the *gez i Khayāti* (the tailor's measure), which was 32 digits or $1\frac{1}{2}$ *dharā'*. The *gez* and *dharā'* are equivalent to a *gām* or *Kādam i Khalki* or *Kādam i ushter i hamvār* (pace, common pace, ordinary pace of a camel) (*Burhām i Kāṭa'* and *Ferhang*).

The 'Nuzhet el Kūlūb' relates that in Mālek Shāh's time (1073 to 1092) a

(12·302 inches), and from the Heraeon at Samos 315 mm. (12·402 inches). (Brandis, p. 21, note 4.) The stadium had 600 feet, hence taking the different values of the foot we get for the stadium 184·8 m. or 606·315 feet (this is the Olympic stadium), 186 m. or 610·25 feet, 188·4 m. or 618·2 feet, and 189 m. or 620·9 feet. A further proof that the Greeks adopted the Babylonian cubit of 525 mm. is that the Samian foot coincided with the Babylonian foot, and that the Samian cubit was, according to Herodotus (ii. 168), equal to the Egyptian cubit, and the latter measured 525 mm. (Brandis, p. 21, note 3.)

number of different farsakhs were in use in Persia. The Khârezm farsakh was one o 15,000 paces, the Azerbâijân and Armenian farsakhs equalled 18,000 paces, the farsakh of Kurdistân, Luristân, Khûrzistân, Fârs, Shebân-Kâreh, Dîarbêkr, &c., had only 6000 paces, and Rûm (Syria), Gurjistân (Georgia), Arran, Môghân, Shîrvân had no itinerary measure at all, but calculated distances by time and stages. Mâlek Shâh therefore defined the farsakh as a distance of 6000 paces. It is not said what was the length of one of these paces. The old Persian pace was equal to three feet of 14 digits (Vendidad, Darmesteter, iii. 17), i. e. $1\frac{1}{2}$ royal cubits or 918·75 mm. This farsakh may therefore have been equal to 5512·5 metres or 3·425 miles. Uljaitû Khân (1303-1316; the author of the 'Nuzhet el Kulûb' was his secretary) placed pillars, *mil* (our milestones) on the roads, and during his time most farsakhs were equal to 8000 gez i Khayâtî, and as the author elsewhere says that the *true* farsakh equalled 9000 gez i Khayâtî, Uljaitû's farsakh must have been $\frac{1}{3}$ shorter. This farsakh of Uljaitû was, I think, the same as the one known as Mamûn's farsakh, and the same which is used and called at present the Farsakh i 'Arab (Arabic farsakh), 3·125 miles nearly. The author himself uses throughout the farsakh of 12,000 old dharâ', that is one of 5670 m. or 3·523 miles.

It is impossible to calculate the length of any measure from any Arab measurements of a terrestrial degree, for the instruments of the Arab astronomers were not accurate enough, otherwise it would be easy to divide the known length of a degree by the number of farsakhs contained in it. The old geographers, following Ptolemy, assumed 25 farsakhs equal to one degree; most Arab geographers, basing their calculations on the measurements of a terrestrial degree made under the Caliph Mamûn, accepted 22 $\frac{1}{2}$ farsakhs as equal to one degree and others held 18 $\frac{1}{2}$ to be the right number. Mamûn's farsakh is the one at present known as the *farsakh i 'arab* and is used in the Arabian provinces (Arabistân) of Persia, while the farsakh in use on the Persian plateau is the *farsakh i 'ajam*, 3·915 miles. From actual measurements I obtained for the former 3·125 miles, for the latter 3·82 miles.* With the Babylonians the parasang was the distance which a robust pedestrian could walk in an hour (and the sun, like the pedestrian, did every hour a distance of thirty stadia, or one parasang on the equator), and this too is the popular opinion in modern Persia. A farsakh, an hour's walk, an hour's distance are synonymous. Hence, the *popular* farsakh in mountainous districts is generally shorter than in plains. The farsakh in the plains of Khorâsân is proverbially long; "as long as the intestines of 'Omar," says the pious Shîa'h. The farsakh was also defined by a man's sight. "A parasang is a measure as much as a far-seeing man may look out, see a beast of burden and make known that it is black and white;" † also by sound, as in Luristân, where a farsakh "is the distance to which the sound of a drum reaches." Sometimes distance and time seem to be synonymous; in Khorâsân one frequently hears that the distance to a place is so many farsakhs for a horse and half as many for a man on foot; for instance, "from Nishâpûr to Kadamgâ, is six farsakhs for a pedestrian and four farsakhs for a man on horseback" (actual distance is about 15 miles). From a Kurd I heard a very peculiar definition of a farsakh; according to him, whenever he found that his shoestrings required tying up he had walked a farsakh.

The smallest Persian measure of length is the *mû*, hair; generally hair of a

* These figures I obtained by dividing the distances of many stages, as roughly measured by myself in miles, by the number of farsakhs in the stages. The latter I took from geographical works.

† Bundahish, West, xxvi. 1.

mule is understood; seven are said to equal (the breadth of) a barleycorn. The *Jû*, barleycorn, broadwise, is the sixth part of an *angusht*, a digit. In old English measure* three barleycorns, round and dry, placed end to end lengthwise, were equal to one inch, while in the 16th century the breadth of four barleycorns made a digit. Four digits make a *musht*, palm, in Arabic *Ḳabzeh* (English measure 16th century, four digits = one palm), and 24 digits or six palms are one *gez* or *dharâ*, a cubit (English measure 6 palms = 1 ell). Intermediate measures are the *bahr*, a Persian word meaning part, portion, equal to the length of a thumbjoint or $1\frac{1}{2}$ digits, and the *gireh*, which equals two *bahr* or three digits. The cubit also equalled two spans. A span is called *wajeh*, and is the span between the thumb and the little finger. The Avesta mentions three different spans: 1. The *Vitasti*,† equal to 12 digits; that is, a span between the thumb and the little finger, and two of these were a cubit (royal?); 2. The *dishiti*,‡ equal to 10 digits, a span between the thumb and the forefinger. If these definitions are correct, the first span having been the longest, it seems that the little finger was formerly quite as long as the middle finger; while, with the present Persians, it is generally more than an inch shorter. There was also the foot, the *padha*,§ new Pers. *pâ*, having a length of 14 digits, that is nearly three-fifths of a cubit of 24 digits. This old Persian foot was probably the Babylonian foot (315 to 320 mm.), which also was three-fifths of the cubit. Three feet were one *gaya*,|| new Pers. *gâm*, step, a pace, the distance between the feet in walking (*Burhân i K.*). The word now generally used in Persia for a step is the Arabic *Ḳadam*; it is sometimes confounded with the *dharâ*. The space between the tip of the middle fingers when the arms are outstretched, also the height of a well-proportioned man, a fathom, is now called *baghal*; also *Ḳad*, Arabic for stature, height of a man; in the Avestâ it is *vibâzû*.

500 *dharâ* are equal to one *amâj*. This is the length of a plough furrow, our furlong (one furrow long), and is the eighth of a *mîl*, mile, like our furlong; it is also defined as the distance an arrow flies, a bowshot.

Four *amâj* are one *nedâ*, explained in dictionaries as the distance a man's voice can reach.

Two *nedâ* equal a *mîl*, a mile (a *mîl* is a column, a pillar, a milestone), and three *mîl* make a *farsakh*.

The terms *amâj*, *nedâ*, are quite obsolete, *mîl* nearly so.

The *farsakh*, as we have seen above, equals 12,000 cubits, *dharâ* or *Ḳadam i Khalkî*, *gâm*, and *Ḳadam i ushtur i hamvâr*, and 9000 *gez i Khayâti*.

Some of the Arab geographers calculated distances in *mîl*, and as they used the *farsakh* of 5670 metres or 3·523 miles, the *mîl*, $\frac{1}{3}$ of a *farsakh*, equalled 1890 metres or 2066·96 yards (1·174 mile), about 120 feet more than an English nautical mile.

Another division of the *farsakh* was the *Kurôh*, and three *Kurôh* were equal to a *farsakh*, therefore same as a mile. Persian dictionaries, copying the '*Burhân i Kâta*', add that the *Kurôh* was in Arabic called *Karâ*, but the author of the '*Ferhang i Anjuman Arâ*' notes that he has not found the word in any book whatever. Another name for *farsakh* was *gâw* (lit. cow); this, according to dictionaries, equalled three *Kurôh* of 3000 or 4000 *gez* each. Hence a *gâw* was equal to 9000 to 12,000 *gez*, probably 9000 *gez i Khayâti* and 12,000 *dharâ*, like a *farsakh*. The terms *Kurôh* and *gâw* for measures of length have also become obsolete.

* Statute 17 of Edward II., 1324.

† Vendidad, viii. 76, 77; xvii. 5.

‡ Vend., xvii. 5.

§ Vend., ix. 8, 9, 11.

|| Vend., iii. 17.

The measures of length as now used in Persia are as follows :—

	Varies from to		Mean Value.	
	inches.	inches.	inches.	millimetres.
1 angusht, digit	·853	·861	·857	21·875
1½ digits = 1 bahr	1·279	1·304	1·292	32·8
2 bahrs = 1 gireh	2·559	2·608	2·584	65·6
4 digits = 1 musht, palm	3·412	3·444	3·428	87·5
6 palms = 1 dhará', gez	20·473	20·867	20·670	525
2 dhará' = 1 zar, double gez	40·946	41·734	41·340	1050

12,000 dhará', or 600 double gez = 1 farsakh = 3·915 miles, or 6300 metres.*

In conclusion, I must mention the popular but rather undetermined measure of length, the *maidân*, somewhat similar to the Greek *ἰσθμίου*. This was originally a measure for horsemen, "as much as a horse could run at full speed without doing itself any harm." It is the charetu of the Avesta (Vend., ii. 25), and is defined by the commentary as being equal to two hathras (2 hazâra, 2000 big paces) that is ½ parasang.

GEOGRAPHICAL NOTES.

Progress of Mr. Joseph Thomson in Morocco.—By telegram dated July 28th our enterprising young African explorer informs us that he had returned to the city of Morocco after two successful incursions into and across the Atlas, in one of which he ascended the highest peak of the range (12,500 feet) north of Amsmiz. He says he has been successful beyond his expectations, and has gathered a store of interesting geographical and geological notes, but not without much difficulty, and meeting with many adventures. He was planning further excursions and is not expected to return to England before the end of the year.

Dr. Junker on Stanley.—Dr. Junker took the opportunity, at a recent meeting of the Swedish Geographical Society at Stockholm, which he attended, to receive the Vega gold medal, to repeat his opinion of the safety of the Emin Pasha Relief Expedition. He said that Stanley would be compelled to obtain food by force for the maintenance of so large a body of men, and that this would render him unable to send messengers back through the tribes thus provoked to hostility. He believed that it was not by way of the Congo, but via Zanzibar that we may expect news of Stanley's safe arrival at Wadelai.

* Others have calculated the length of the farsakh as follows :—

	Miles.
Sir. J Malcolin, 'Hist. of Persia,' 3 miles 720 yards	= 3·409
V. Klöden, 'Handb. der Erdkunde,' 16,904·4 Paris feet	= 3·413
Pape, 'Griech. Wörterbuch,' 17,659·74 Rhenish feet	= 3·445
H. G. Watson, 'Hist. of Persia,' 3 miles 787½ yards	= 3·447
Woolhouse, 'Weights and Measures of all Nations,' 6076 yards ..	= 3·452
'Civil Engineers' Notebook,' 6086 yards	= 3·458
Binnings, 'Travels, Persia, Ceylon,' 3½ miles	= 3·75
Dr. Schlimmer, 'Terminologie,' 6270 metres	= 3·896

The Mean Elevation of Africa above Sea-level.—An exhaustive paper on this subject is contributed by Herr F. Heiderich to Petermann's 'Mitteilungen' (Part 7). The mean altitude of the African continent is a question which of recent years has been investigated by many geographers, including Chavanne, de Lapparent, and J. Murray. The author of the article in question, however, deals with the subject in a different manner from any of his predecessors. Having divided the continent into a number of trapeziums, measuring 10 degrees each way, he first found the mean height of each of such sections, and then obtained the mean height of each zone of 10 degrees of latitude, whence the corresponding result for the whole continent was ascertained. He utilised the most recent and reliable hysometrical data in his calculations, and the resultant figure for the mean height of the continent is 2208 feet. Compared with the result obtained in 1881 by Chavanne, who proceeded upon the plan of determining the mean height of numerous cross-sections drawn in all directions through the continent, there is only a difference of 37 feet, the figure worked out by the latter being 2171 feet. De Lapparent, whose method was different from both Heiderich and Chavanne, declares the mean height to be 2008 feet, while Mr. John Murray, in his recently-published work 'On the Height of the Land and the Depth of the Ocean,' gives 2021 feet as the maximum, and 1741 feet as the minimum figure, according to his calculations. The average of these five results is 2030 feet. The following are the mean heights of the various zones as determined by Herr Heiderich.

				feet.					feet.
Between 30° and 40° N. lat.	..			1919	Between 0° and 10° S. lat.	..			2720
" 20° " 30° "	..			1273	" 10° " 20° "	..			3307
" 10° " 20° "	..			1611	" 20° " 30° "	..			3327
" 0° " 10° "	..			1106	" 30° " 40° "	..			3904

African Cartography.—Baron Nordenskiöld announces that he has a work in the press on maps of Africa, from the earliest date down to the 17th century. The material he has collected is very large, and he intends to give facsimile prints of all the early maps.

The Caucasus.—The first of the English mountaineers who have this year visited the Caucasus, Mr. A. F. Mummery, has already returned after a successful and very pleasant journey. Starting about the end of June with an Alpine guide, Zurfluh of Meiringen, he went straight to the central group, of which Koshtantau, 17,096 feet, the second (measured) peak in the Caucasus, is the highest (measured) summit. The qualification is necessary until the height of Shkara (see Mr. Freshfield's recent map and paper) has been ascertained. The difference in height between the two peaks is not very great, perhaps 250 feet, but it appears likely that Shkara will, as Mr. Freshfield has anticipated, prove to be the higher. On July 24th, Koshtantau was ascended; two previous attempts, on one of which Mr. Mummery

climbed alone the south-western buttress of the great mountain, itself 13,500 feet high, having been unsuccessful. In the course of Mr. Mummery's journey the lofty ridge connecting Dychtau and Koshtantau with the watershed, and dividing the névés of the Bezingi and Dychsu Glaciers, was twice crossed by passes respectively about 13,000 and 13,700 feet. An attempt to ascend Shkara from the Dychsu Glacier had to be abandoned in consequence of glacier difficulties which were too great and continuous for so small a party.

The main chain was also crossed into Suanetia by a variation of the Zanner Pass (described by Mr. Freshfield), and a return to the valley of Chegem on the north side effected by a route over the Thuber, Gvalda, and Basilsu Glaciers, lying to the west of the natives' Basil Pass, and never before traversed, which throws light on the intricate topography of the névés of these great icestreams, and the structure of this part of the chain. The upper névé of the Gvalda Glacier proves to extend to a point considerably east of a line drawn due north from the lower extremity of the Thuber Glacier. The weather was fine throughout, and the snow, except on steep slopes, in excellent condition. The revision of the Russian survey is to proceed very rapidly. A single officer has been instructed to survey the square represented in the map published with the June 'Proceedings' during this summer, and the new map is intended to be published at Tiflis in the spring of 1889.

Mr. Mummery writes as follows with regard to Caucasian travel, and his experiences are the more valuable, inasmuch as he went without previous experience of the country, or special facilities:—"No other holiday has afforded me half the pleasure. I found the travelling much easier than I expected. Notwithstanding that my interpreter proved too short-winded for the high passes, I managed to get all I wanted, from chicken, ducks, eggs, new potatoes, and Russian bread, in Suanetia, to mutton, oatcakes, and fresh milk in Balkar and Chegem. I became great friends with the old chief at Bezingi, who gave me several dinners in his private apartments. I in return provided tea and sugar for himself and his numerous relatives and friends. One of the Bezingi hunters accompanied me over the glacier passes, but not on the ascents. Some of the Bezingi men are splendid walkers, equal on rocks to average Alpine guides; on ice, of course, they have much to learn, and their foot-gear is ill-suited for continuous mountaineering. The diurnal variations in the weather are also perhaps worth notice. Bright mornings, wind and a little cloud about mid-day, with mist and a suspicion of rain or snow at sunset were the characteristics of the weather while I was there. The mist and showers did not extend below 8000 feet, but the dews were quite sufficient to account for the vegetation on the moraines. My aneroid on the top of Koshtantau showed a height of 7700 feet above the point marked 9500 feet on the recent R.G.S. map. This would indicate a height of 17,200 feet above sea-

level, a result approximating as nearly as could be expected in so rough a measurement to the 17,096 feet of the five-verst map."

Murder of an Indian Surveyor in Burma.—Information has been received from Major J. R. Hobday of the murder of Mr. G. H. Powell, an assistant surveyor of the third grade of the Indian Survey Department, while engaged on mapping work in Upper Burma, at a village near Thamakan, eight miles north of Konni, a new post in the Southern Shan States. Mr. Powell only joined the Department in 1885, and was a young officer of much promise.

Retirement of Lieut.-Colonel Heaviside, R.E.—Lieut.-Colonel W. J. Heaviside, R.E., has just retired from the Indian Survey Department after a service of over twenty years in that Department, during which he had charge of several important geodetic and geographical operations, notably the completion and extension of the series of pendulum observations, formerly carried on by Captain J. P. Basevi. Colonel Heaviside also served in the Bhutan expedition, and in Afghanistan, and accompanied the Thal Chotiali force under Sir M. F. Biddulph on its return to India.

Interior of German New Guinea.—Count Pfeil, the new administrator of German New Guinea, made a short journey inland from Finsch Haven shortly after his arrival, with a view to ascertain the nature of the inland country from the summits of the coast ranges. He penetrated further than any one had done before, but failed to discover what he had hoped for, namely, an expanse of tableland useful for settlement. On the contrary, he found the country one mass of mountains, torn and tilted in the most confused manner, a rugged and hopeless region. During his short journey he saw neither bird nor insect, though he passed through wooded tracts. The geological formation seemed to be of old sedimentary rocks. This agrees so far with Dr. Hollrung's description of the south-eastern part of the same territory. Count Pfeil had previously distinguished himself by his travels and accurate scientific observations in the interior of East Africa.*

M. Nansen's Expedition across Greenland.†—The sealer *Jason*, which was engaged to convey M. Nansen's Greenland expedition from Iceland to some spot on the east coast of Greenland, has returned to Norway with the news that the expedition left that ship on July 17th, at 7 p.m., in lat. 65°2' N., off the Sermilik fjord. The captain of the *Jason* adds that open ice about 10 miles in width separated the vessel from the shore, but that the expedition was seen to make good progress, rowing in their boats through the open "leads" or walking over the ice-floes where there was no open water. The expedition was in sight until midnight, when a fog came on, and hid it from view.

* Vide 'Proceedings R.G.S.,' ante, p. 94.

† Ibid., pp. 241, 417.

Most probably the members would reach the shore next day. At 6 a.m., when the fog lifted, they were nowhere to be seen. In a private letter Dr. Nansen appears delighted with the idea of getting ashore at this spot, as it is inhabited, and is the very place recommended him for landing by Captain Holm, the well-known Greenland explorer, as further east, in the neighbourhood of Cape Dan, the coast is terribly wild and rugged. At the time of landing, the edge of the inland ice could be seen from the *Jason*, and the country did not seem to offer any particular obstacle to a safe ascent. Having reached land, which we may now presume he has effected, M. Nansen will proceed to the head of this fjord, which is 65 miles in length, and then attempt an ascent of the inland ice. The mountains around the bottom of the fjord are high—upwards of 6000 feet, and terribly steep—but M. Nansen hopes, by the aid of the natives in particular, to find some pass through which he may accomplish the ascent. Behind this chain of mountains towers the enormous ice-field called the inland ice, stretching away comparatively smooth, but with a great incline, to the west coast. It is admitted by all competent authorities, including the Danish officers who had commanded the recent expedition along the east coast of Greenland, that once on the level surface of the inland ice Dr. Nansen's task is comparatively easy. The greatest difficulties were anticipated in respect of obtaining a landing, the bold Norwegian savant having been recommended by sneering opponents to adopt the habits of the Polar bear before making any such attempt. But this we may now consider overcome. M. Nansen estimates the distance from the east to the west coast at about 425 miles, and with a rate of progress of 15 miles a day—a most moderate allowance for *ski* runners even if hampered with a sledge—he hopes to accomplish the journey in about one month, but provisions have been provided for three. By crossing from east to west, instead of as attempted by Nordenskiöld in the opposite direction, M. Nansen will only require provisions for *one* journey, as the west coast is well inhabited. The greatest difficulties anticipated on the inland ice by the explorer are wet snow, and ice ravines, such as were encountered by Nordenskiöld. On the former the *ski* are of little use, as they sink deep into it and get clogged with snow; but for this eventuality the expedition carries Canadian snow-shoes and *tuer*, a specially constructed snow-shoe, somewhat like the former, in use in some parts of Norway, even on horses; and as to the latter, M. Nansen will attempt to evade them by sending on the Lapps of his party in front to reconnoitre, a purpose for which they are particularly adapted by their indifference to privation and great skill in *ski* running. This was amply proved by the Nordenskiöld expedition, when his two Lapps, having been sent on in advance, covered 140 miles in 57 hours, without any other rest than that obtained for a few minutes on the hard snow, and it is Nordenskiöld's opinion that no future Arctic land expedition should be without these hardy sons of the Lapland desert.—The expedi-

tion will follow a north-westerly course, reaching the west coast in the Christianshaab district, as further south there are deep fjords and high mountains to be encountered. It is also expected that the easterly winds generally prevailing on the inland ice may also aid the expedition in sailing the sleighs, and at this season of the year a thaw can hardly be encountered. Another danger to be avoided are the so-called "Nunataks" i. e. mountain tops rising above the ice-field, as around these it is piled up or split into yawning crevices through the forward pressure of the ice, as found by Captain Jensen in the Fredrikshaab district.

Meteorological Observations in the Island of Barbados.—We have extracted from the Annual Report for 1887 of the Governor of Barbados (No. 19) the following summary of the results obtained by the meteorological station in the island. The station is situated on the Joes river at an elevation of 430 feet above the sea-level. The mean air-temperature was $76\cdot9^{\circ}$ F., the highest reading, 88° , occurring in the month of October, and the lowest, 67° , in January and December. The rainfall during the year amounted to $73\cdot59$ inches, distributed over 180 days. There were thunderstorms in every month from May to December. The direction of the wind was as follows:—from the north-east on 274 days, from the south-east on 86 days, from south-west on two days, and from the north-west on three days. The average force of the wind was 10 miles an hour.

Primitive Indian Tribes in Central Brazil.—On the 10th of July last, Dr. Karl von den Steinen read a paper before the Geographical Society of Rio de Janeiro (the Imperial Princess Regent being present) in which he gave an interesting account of his second visit* to the wild country of the Upper Xingu, through which he and his party passed on their first journey down that river in 1884. The object of this second visit was to study more thoroughly the ethnic relations, languages, traditions, and customs of the Indian tribes whom he had discovered living, entirely isolated, in the region of dense forests and barren rugged uplands traversed by the torrential streams of the Upper Xingu and its eastern tributaries. He left Cuyaba on his self-imposed mission on the 14th of July, 1887, visited the villages of altogether nine tribes, learning the language and gaining the confidence of some of them, and noting down from the mouths of the elders their myths and legends, and returned to Cuyaba on the 31st of December. Some of the results of his inquiries are of great interest: for example, he found the uses of metal entirely unknown to all the tribes; they were, in fact, in the neolithic stage, axes of stone being the only tools with which they fell the forest

* Vide 'Proceedings R.G.S.,' *ante*, p. 309. The present note is taken from the verbatim report of Von den Steinen's lecture in the 'Jornal do Commercio,' of Rio de Janeiro, July 10th, 1888.

trees to clear the ground for their plantations, and stone hammers being used, with stone nails, to perforate their shell ornaments. For knives they have only the sharp teeth of the fish *piranha*; with these and with planes made out of river shells they carve their rudely ornamented stools and weapons. Domestic animals, except pet parrots and other birds, are entirely unknown; fowls even, which have found their way into the remotest parts of the Amazons valley where navigable rivers have afforded access to traders, were apparently not seen by the traveller; and dogs are unknown. Of cultivated vegetable products, they are ignorant of the banana in its different varieties, of sugar-cane and rice, their plantations consisting of Indian corn, mandioca, sweet batatas, cará, cotton, and tobacco. As to their religious notions, Von den Steinen found that they had no idea of a God, but believed in a soul, which goes on its separate wanderings during sleep, and in a future state. Among their myths, the most important appeared to him to be one relating to the creation of the world; their world being limited to the head-waters of the Upper Xingu and the Tapajos. The principal tribes, and those from whom Von den Steinen chiefly gleaned his information, he believes, from their language and pottery, to belong to the once powerful and aggressive Carib nation, and, in fact, to be a relic of the original stock of that people, who migrated from south to north. One of the nine tribes proved to be primitive Tupis speaking the language on which the early missionaries founded the "lingoa geral," and one tribe differed so widely in physique and language from all the others, that he was unable to discover its relations to other divisions of the South American race.

CORRESPONDENCE.

The Dutch Boundary Line in North-eastern Borneo.

4 AND 6, TREGMORTON AVENUE, E.C.,
30th July, 1888.

SIR,—With reference to a letter from the President of the Geographical Society of the Netherlands on the Dutch boundary line in North-eastern Borneo, which was published in the July number of the 'Proceedings' of your Society, I am desired to make the following remarks.

In the grants of the territory acquired by the British North Borneo Company the southern limit on the east coast was fixed at the Sibucu river. The Dutch boundary was considered at the time to be at the (so-called) Atas river (about 3° 20' N. lat.), as defined in their official decree of 1846, and as subsequently confirmed and recorded in their official map of 1857. In this map the territory north of the Atas river is stated to belong to the Sultan of Sulu. It was thus supposed that a zone of independent native territory—some 40 miles—was left open between the Company's territory and the Dutch boundary as last officially declared. So far as it has been possible to ascertain, no official notice had been given to Great Britain, Spain, or any foreign Power of any variation of this boundary, although individual Dutch and other

geographers have published maps, marking the Dutch boundary, in a hap-hazard manner, 1° (more or less) to the northward of the Atas river.

In October 1879 the Dutch man-of-war *Macassar* paid a visit to Sandakan Bay, when official visits were exchanged between the captain, Baron Verschner, and the Company's Resident, Mr. W. B. Pryer. The *Macassar* left Sandakan on 6th October, and shortly afterwards it became known to Mr. Pryer that the Dutch flag had been hoisted at Batu Tinnaga, a point on the north bank of the Tawas river, erroneously marked on some of the charts as the Sibuco river (the mouth of which lies some miles to the southward), and thus within the boundaries of the territory ceded to the Company. Mr. Pryer availed himself of the first opportunity to protest against this encroachment, and on being visited in July 1880 by the *Atjeh* and *Macassar*, wrote to the senior officer, Capt. H. O. Wickers, of the former vessel, respectfully requesting that the flag should be withdrawn. In his reply, Capt. Wickers stated that he had no authority in the matter, but would forward the protest to the Dutch authorities.

Though the Netherlands Government had for some years claimed the provinces of Tidong and Bulungan (a claim which the Sultan of Sulu never admitted), yet, until 1879, it had little or no control over the natives of the country, the town of Bulungan having been a notorious slave market and the resort of the Celebes and Balignini pirates, from whence they obtained supplies of arms and ammunition.

The official statement made in the Dutch Chamber, when introducing the budget of 1880, admitted that "the supremacy of Spain over the dominions subject to Sulu in the north-eastern region" (the southern boundary of which was officially admitted in 1846, and again in 1857, to be the Atas river) "has never been called in question by Holland"—from which it would appear that, however reluctant the Netherlands Government may be to admit to the British that its true official boundary is the Atas, or 3° 20' N. lat., it would have raised no objection had Spain been recognised as the owner of any portion of the ceded territory.

The native hostility to the Dutch occupation was shown by the cutting down of the Dutch flag at Batu Tinnaga, and an open declaration in favour of the English Company.

The cessions to the English Company were completed in January 1878, and the Sandakan Residency was established in the course of the year; yet no attempt was made to hoist the Dutch flag at Batu Tinnaga until the end of 1879. It was only subsequent to Mr. Pryer's success in establishing the authority of the Company in the ceded territory that Dutch men-of-war went up the coast, and the Netherlands boundary arbitrarily advanced.

BENJN. TORIN KINDERSLEY, *

Secretary, British North Borneo Co.

To the Secretary of the Royal Geographical Society.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris, June 1st, 1888: Dr. HAMY in the Chair.—M. G. Rolland, engineer of mines, in presenting a copy of the recent communication made by him to the Academy of Sciences on "The ancient alluvia of the Sahara, their Pliocene age, and their synchronism with the Pliocene fresh-water formations of the Atlas," announced the completion of his investigations of the geology of the Algerian Sahara. He had since 1880 been engaged in studying these alluvia of the Sahara which cover about one-half of the immense area of the desert.

The result of his researches was to confirm his original opinion, that these formations were of less recent date than had been hitherto supposed, and that they belonged for the greater part to the Pliocene, and not to the Quaternary period.—An important communication was received from M. Venukoff, giving some of the geographical results recently obtained in various parts of the Russian empire and elsewhere by certain members of the Society of Naturalists of St. Petersburg, in the course of their scientific works. M. Korotnef had made a voyage in the Malay Archipelago with the special object of studying the invertebrates of that region. In June 1887 he visited the vicinity of Krakatoa, where several small hamlets had already been formed. These were surrounded by a magnificent vegetation, while the neighbouring parts of the sea were still covered with floating pumice-stone, and the sea itself contained no animal life. On the island of Billiton the traveller met with the interesting tribe of the Secasses, who make floating houses of their canoes or live in huts built on piles of wood. They are distinguished from the Malays by their tall stature, curly hair, and prominent cheek-bones; a curious fact is that nearly all of them stammer. The traveller describes them as honest, lively, and hospitable. M. Nicolsky, another Russian zoologist, has, according to M. Venukoff, made some interesting researches in the basin of Lake Balkash. He has discovered that this basin has for ages been separated from the valley of the Chui by plateaus and mountains of very ancient formation, dating from the Jurassic and even the Devonian epochs. This is the cause of the notable difference between the ichthyological fauna of the Chui and that of the Ili. Lake Balkash, Sassyk-Kul, Ala-Kul, and even Ebi-Nor, probably formed at a comparatively modern date one vast basin of fresh or slightly brackish water, their ichthyological faunas being identical at the present time. The steppes surrounding Lake Balkash on all sides differ in character according to their position. Those on the north-west are clayey and entirely bare in summer, but covered with pools in spring; those to the south-east are formed by sand-beds, in which there are no pools, but water is found at a certain depth. The steppe to the west of the lake is characterised, from a zoological point of view, by the presence of jerboas and larks, while to the south of the lake numerous reptiles, and especially tortoises, are found; there are very few birds. M. Venukoff also gave some account of M. Lidsky's journey in Karateghin and the country east of Bokhara.* Another Russian naturalist, M. Kuznetzof, has, according to the same correspondent, made some zoological and physico-geographical studies with respect to the Sea of Azof. Its waters, which are brackish rather than salt, contain only 1·19 per cent. of salt, while the Black Sea contains 1·75, and the Mediterranean 2·3 per cent.; consequently real salt-water fish are not found in it.—M. R. du Caillaud forwarded some geographical information extracted from recent French missionary publications, from which it appeared that M. de Courmont, of the Zanzibar district, was about to establish a station on Mount Kilima-njaro, while the missionaries on the West Coast of Africa had founded a station on the Fernand-Vaz among the N'Komis. This tribe had possessed this region from time immemorial, never having been dispossessed even by the Pahuins.—From Brazzaville M. de Chavannes wrote on 23rd March last, correcting the position of Boko-Songo on the map recently sent by him to the Minister of Public Instruction. This point is situated in 4° 29' 33" S. lat. and 11° 10' E. long, or about six miles from the position he had formerly assigned to it.—M. René Allain draw the attention of the Society to the interest for France which attaches to the taking possession of the Clipperton, Easter, and Vanikoro Islands. After the opening of the Panama Canal, Clipperton and Vanikoro would be on the route from Tahiti and New Caledonia.—In conclusion, M. Louis Blanchet

* See Geographical Notes, ante, p. 531.

spoke upon navigable routes in Cochin China and Cambodia, and their commercial importance. He was of opinion that the fluvial routes were the natural means of communication in that country, and that it was useless to attempt the construction of railways. The principal rivers—the Mekong, Donnai, Saigon, and the two Vaicos—were connected with each other by a network of canals, which afforded ample means of communication. As regards the navigation of the Upper Mekong, he thought that it was by no means impracticable. He had recently, in company with M. de Fesigny, navigated in a small steamer the Preapatang rapids, hitherto regarded as impassable. It should be the aim of the administration to improve navigation on the upper part of this great river, especially in view of the efforts which England was making to divert the trade of the fertile provinces of Laos to Upper Burma. The Chairman, in thanking M. Blanchet for his remarks, announced that as a result of the same an anonymous donor had placed at the disposal of the Society a sum of 40*l.*, to be awarded to the best memoir on the subject of the Upper Mekong, and the improvements necessary to increase its navigability. The Central Commission would award the prize next year.

— June 15th, 1888: Dr. HAMY in the Chair.—M. M. Venukoff drew the attention of the Society to the latest scientific work published by General Tillo. This was a hypsometrical map of the rivers of Russia in Europe, containing the results of the survey of the same executed by the engineers of bridges and roads. He also stated that the following explorations of Russian territory were in contemplation this year by members of the Society of Naturalists of St. Petersburg:—M. Paul Venukoff would be occupied with geological studies in Volynia; M. Loewinson-Lessing would be similarly engaged in Courland; M. Margaritof, Member of the Society for the Scientific Exploration of the Russian Provinces in the Basin of the Amur, would study topographically and geologically the environs of the Gulf of Possiet, where the coal-mines remained still little known; and M. Rosseti would explore in detail the Seal Islands and Patience Bay in the Island of Saghalien. M. Venukoff further added that he had just been informed by letter from Vladivostok of the completion of the travels of MM. Kalinovsky and Delatkevitch in Korea. The former traveller had been exploring, mostly on foot, the whole country between Seoul and the Russian frontier during the last two years and a half.—M. Reveillère forwarded from Brest a manuscript map of the Upper Mekong prepared by M. de Fesigny, together with two reports, one of which gave a complete account of the operations effected by that officer since the commencement of his mission, and the other contained a *résumé* of the voyage made by M. de Calan from Khong to Siempang. In connection with these communications it was stated that a French explorer, M. Gauthier, had successfully navigated the Mekong from Luang Prabang to Khong, and that he had subsequently drawn up and deposited with the Governor-General a scheme for establishing two lines of steamers, one from Khong to Kemmarab, a distance of 185 miles, and the other from the latter point to the rapids 37 miles below Luang Prabang, a distance of 370 miles. The commercial advantages of these lines would be very great.—A memoir on the lakes of San Miguel (Azores) was sent by M. J. de Guerne, who had some opportunities of studying the island during the third scientific campaign of the *Hirondelle*. His exploration of the lakes was chiefly from a geological point of view. He states that in lakes hitherto supposed to be destitute of animal life he discovered a great number of fish, although not comprising many different species.—The Minister of Public Instruction forwarded a report which he had received from M. Thouar on his recent explorations on the Pilcomayo. The Chairman at a later stage of the meeting announced that that intrepid explorer had just returned to France. The following is an outline of the three sections of the traveller's operations since his departure from France in April

1885:—(1) From 31st July, 1885, to 15th December, 1885, he explored the delta of the Pilcomayo from its mouth to about 100 leagues into the interior; (2) From 28th February to 20th July, 1886, he travelled from Buenos Ayres to Sucre and surveyed the Upper Pilcomayo; (3) From 2nd December, 1886, to 18th November, 1887, he was engaged in exploring the Northern Chaco. He has prepared numerous itineraries, and has made observations on the fauna, flora, meteorology, geology, and ethnography of the regions traversed, besides fixing many points astronomically.—M. G. Rolland engineer of mines, laid upon the table his recent work on the 'Geology of the District of Lake Kelbia and the littoral of Central Tunis' (with geological map). He stated that the exploration which, as a member of the Tunis Scientific Mission, he had made since 1885, led him to the conclusion that neither Lake Kelbia nor even the Sebkha Halk-el-Menzel had within historical times communicated in a permanent manner with the Gulf of Hammamet. He was of opinion that the configuration of the soil of the whole of this region had not materially changed within historical times. The salient features in the orography of the country were of most ancient formation. It was possible that at the Roman period the general level of the water was higher in consequence of the more abundant rains. Then, as now, Lake Kelbia communicated only intermittently with the sea. With regard to the shore lagoons, he stated that these never formed maritime bays, but were rather lakes of small depth draining into the sea by comparatively narrow channels.—In conclusion, M. Louis Vincent, who, as French Resident, had just passed two years in the Comoro Islands, read a paper upon the Island of Mohilla and its inhabitants. The population of the island was greater than had been supposed. He estimated it at from 8000 to 9000. The climate was very unhealthy. The temperature in winter varied from 71° to 100° (Fahr.). The rains were frequent and torrential. The barometrical variations were slight.

Geographical Society of Berlin.—June 2nd, 1888: Baron von RICHTHOFEN in the Chair.—Herr von Krasnof read a report upon his journey in the Thian Shan, which he undertook in the year 1886 in company with Ignatief, the geologist. The chief object of the expedition was to connect with each other the itineraries of the earlier travellers, von Semenov, Severtsof, Baron Kaulbars, Prjewalsky, Mushketof, &c., and to give the most complete representation possible of the distribution of plants in these regions, and by this means to supplement the descriptions given by Severtsof, Semenov, and Mushketof, of the conditions of vegetation in the Tekes and Issik-Kul Valley, and also in the Trans-Ili, Ala-tau, and Terskei-tau mountains. The following is a résumé of the traveller's routes. From Vernoe he first of all crossed over the watershed between the Chu and Ili rivers into the Tau-Kum desert, and thence visited Lake Balkash. Returning to Vernoe he set out eastwards to Charin, and travelled over the Santash Pass down into the Tekes Valley. Thence he proceeded over the Ketmen Pass into the Ili Valley, and back to Lake Issik-Kul by way of the Santash Pass. The traveller next ascended the Terskei-tau range along the Turgun-Asku Pass and explored the glacier region of Sari-jas at the foot of Mount Tengri Khan; then marching over the Kuolu Pass he reached the upper valley of the Naryn, whence he proceeded through the Ak-bel and Bedel passes to Ush-Turfan in Kashgaria. Along the same route he returned from these over the Sank-shak Pass into the Issik-Kul Valley, and thence across the Kungi-tau and Trans-Ili Alatau and up the Koi-su and Almaty Pass to Vernoe. From the latter town he made his way back to Europe, via Tashkend, Bokhara, and Merv. With regard to the glaciers of these regions traversed, which were first discovered by Semenov, the results of the expedition are as follows. In the upper course of the Sari-jas there are three glacier-groups. (a) The glaciers of the Semenov group. The Semenov glacier,

which is $6\frac{1}{2}$ miles in length, moves at the rate of 2·03 feet in 24 hours. Four smaller glaciers are still in existence. (b) The Mushketof glacier group. The principal glacier is $4\frac{1}{2}$ miles long. (c) The group of the Tesnyn-bassy glacier, situated on an affluent of the Sari-jas. These glaciers, as is shown by numerous glacial marks, must have formed at an earlier period parts of one colossal glacier, which extended from Tengri Khan into the valley of the Sari-jas. In the Kuelu range two glaciers were discovered, one of which was $3\frac{1}{2}$ miles in length. The region of the greatest glacial covering is the Ak-shijrak range, which possesses three glacier groups, of which the Sir-tash group contains six glaciers. The principal mountain chains also, like the Trans-Ili, Alatau, and Kungi-tau, were at one time thickly covered with glaciers; in the Koisu Pass, as well as on the upper course of the river Kebin, glacier remains, moraines, and old ice are still found. Mushketof came across old moraines even on the shore of Lake Issik-Kul at an altitude of 5500 feet. At the present time the terminal moraines of most of the glaciers lie at a height of 10,825 feet. The earlier glacial covering of the Thian Shan was much larger than has been hitherto supposed; the existing glaciers are only scanty remains of much larger ones, they have decreased in size to such a degree that they will not for the most part bear comparison with those of the Alps. The glacier ice is very dirty. The beautiful blue colour of the Alpine ice is nowhere to be seen; the numerous grottoes are consequently as dark as railway tunnels. The small extent of the glacier tongues is worthy of notice in contrast with the enormous ice-fields. In the case of the longest of the glaciers measured, viz. the Petrof glacier in the Ak-Shijrak group, which is $12\frac{1}{2}$ miles in length, the ice-stream is only five times longer than the breadth of the ice-field, while in the Alps a length thirteen times greater than the breadth is not infrequently met with. The ice is not so rich in pores as in the Alps. It is only the north-west winds that carry moisture to the Thian Shan. In summer, when the clouds travel high, snowstorms are frequent in the glacier regions, and interfere very considerably with exploration; in the autumn and especially in the winter much brighter weather prevails and the air is very dry. The high tablelands of the glacier regions are in consequence almost free from snow. Here during the heavy frost and in the brilliant sunshine the Kirghizes nomadise; their camels and horses pasture off the Alpine vegetation lying under its thin covering of snow. The longitudinal valleys which were formerly filled up with pebbles and glacier-mud, have been, since the diminution of the quantity of snow, worn into deep and often cañon-shaped ravines. The sparse snowfall and summer rains are not sufficient to produce a vegetation on the southern slopes; up to a height of about 11,000 feet the slopes are covered with dust, and are destitute of vegetation, whereas on the north side green meadows abound. The "loess" formations in these parts should, in the opinion of the traveller, throw a clear light on the manner in which the loess-like glacial deposits in Europe were formed. At the time when these strata were formed in Europe a dry and continental climate prevailed, and at that period the steppe fauna and flora were spread all over Europe. No one, however, has been able to prove that the precise steppe conditions of Central Asia prevailed in Europe. A comparison of the present conditions in the Thian Shan with the situation which existed at the time above mentioned makes it appear probable to the traveller that the conditions of the Central Asian uplands were then present in Europe. The flora of the Alpine parts of the Thian Shan is very rich, like that of the Swiss Alps; it may be divided into two sections, that of the ranges which extend as far as the northern slopes of the Tuski-tau, and that of the glacier regions and of the southern slopes. The former is very similar to the flora of the European Alps; there, as here, are found verdant meadows and the well-known accompanying vegetation of the European Alps, i. e. edelweiss, *Papaver alpinum*,

gentians, &c., in short, about 66 per cent. of European species. Close beside the melting snow flourishes a luxuriant nival flora. Up to a height of 13,000 feet species of *Parrya*, *Corydalis*, and *Cerastium* are found. The similarity between the flora of the Thian Shan and that of the Alps is not, however, universal. Many forms are missing; thus the turf-mosses and the plants connected therewith, and tracts covered with mosses and underwood are not present, in the same way the beautiful Alpine clumps of azaleas, rhododendrons, and helianthemums are also missing. The great variations of temperature and the brief period of vegetation have caused the dying out of these forms. In fact, the conditions of life for vegetation in the Thian Shan are very unfavourable. On the 1st September the country in the vicinity of the Almaty Pass was covered with snow, and even during the summer a thick covering of snow, which fell during a snowstorm lasting for two days, lay over the meadows of Terski-tau. After two days the weather became clear again, the snow melted, and the poppy, gentian, and violet blooms appeared again fresh and luxuriant. Only those Alpine plants most capable of resistance can withstand such meteorological changes. It appears to be quite otherwise on the southern slopes of the mountains. With the exception of the moraine plants, which belong mostly to endemical or Himalayan forms, nearly all the species which flourish on the north side disappear. In their place forms unknown in the European Alps appear, and these represent a flora of the Alpine steppes and Alpine prairies. The soil is in many places quite bare; the plants that do exist appear to be poor and sickly. They are principally Compositæ, Cruciferae, Papilionaceae, and grasses several years old, and are for the most part of the same genera as those which belong to the genuine steppes. The species, however, are generally quite different, and are endemic. Only a few, like the *Triticum pertinctum* or *Artemisia rupestris*, belong to the most diffused species. These rarely-seen plants support the supposition that in the glacial period the flora of Asia and of Europe were much more alike than at the present time, and that the European "loess" regions were covered not with the flora of the Asiatic deserts, but with the forms of the Asiatic Alpine steppes. While in Europe the climate becoming gradually milder allowed the immigration of various forest and meadow plants, in Asia the low minima of temperature permitted no return of the flora of the temperate zone. The Kara-Kirghizes, who are closely related to the Kirghizes of the plains, but who live in hostility with the latter, form the population of the Thian Shan. In spring and autumn they nomadise in the Issik-kul and Tekes valley, where some of them have already become settled farmers. In summer, and especially in winter, they roam over the glacier regions. At an earlier period they were accustomed to do this only in the summer, but the increasing colonisation of the eastern part of the Issik-kul valley by Russian colonists has driven them backwards into the Tuski-tau Mountains. They are good-natured; traces of "Shamanism," e.g. sacred trees, are still often found among them; nevertheless, Islam is making great advances, and many of the Kirghizes already go to Vernoe in order to gain a livelihood as servants, coachmen, interpreters, &c.; indeed, some are pupils of the gymnasia, where they are making rapid progress.

— July 7th, 1888: Baron von RICHTHOFEN in the Chair.—Dr. Hollrung, the botanist of the expedition sent out by the New Guinea Company in the year 1886 to Kaiser Wilhelm Land, read a paper upon that country and its inhabitants. Although the coasts of this German part of New Guinea may be roughly represented by a line running in a slightly curved outward bend from south-east to north-west, in which Astrolabe Bay and Huon Gulf form the only breaks, and although the coasts appear to be but little indented, the detailed exploration has nevertheless shown that the country, contrary to opinions which formerly prevailed, is much

more indented and richer in harbours than had been supposed at an earlier date. The reefs lining the coast, which were the terror of former mariners, have completely lost their dangerous character, as they are found mostly to lie close under the shore, and the positions of the few which exist in the open sea are well known. In fact, the steamers of the Company make journeys by night from station to station without having up to the present time met with any mishap. The northern part of Kaiser Wilhelm Land is flat from about 4° N. lat.; the southern portion is mountainous, and the mountains are very much broken. Deep valleys run between the separate ranges; broad valleys are seldom encountered. The slopes of the mountains decrease in steepness as one goes northwards; in the north, mountain ridges with gentle slope predominate. The northern plain, which extends across into the Dutch territory, is a pronounced level depression. The number of rivers is surprisingly great. Those of the southern part of the country have narrow, rocky beds, short courses, and a steep fall. The northern rivers, and especially the Empress Augusta river, have extensive courses, large volumes of water, and afford very excellent facilities for navigation into the interior of the country. The mouth of the Empress Augusta river is totally free from deltas. The river is navigable for large ocean-going steamers for about 100 miles up stream, and for steamers of 10 feet draught up to a point situated in 141° 50' E. long. and 4° 15' S. lat., which is distant 50 miles from the Dutch, and 55 miles from the English boundary. It exhibits in its very tortuous course the following peculiarity, viz. that all the four affluents discovered come from the right side of the river, and that the first of them flows into the river under 142° 15' E. long., 120 miles from the coast. The river banks are throughout its course high, but this does not prevent periodical overflowings of the river. The mean temperature of the coast region is about 79°, the extremes alternate between 66° and 95°. The conditions of rainfall are very favourable; the rainfall is especially abundant in Astrolabe Bay, in consequence of the Finisterre range of mountains, which rise in the country behind to an altitude of about 20,000 feet. At this point, in the course of a year (1886-7), a fall of 148½ inches and 185 rainy days were observed; in Finsch Haven 102 inches and 194 rainy days. Hatzfeldt Harbour is the driest point, because it is situated in the vicinity of the great northern plain. Here 80 inches of rain fell, and there were 151 rainy days. A great contrast appears to prevail between the southern and northern portions of the country with regard to the rainy seasons. In Finsch Haven the principal season of rain is in July and August, and there is a dry season, although not altogether without rain (the fall being 7½ inches) in January, whereas in Constantine Harbour and Hatzfeldt Harbour August is strictly the driest month, and the most rain falls in February. Little is known of the geology of Kaiser Wilhelm Land. The coast zone is coralline, the interior mostly of a volcanic nature, and on the Empress Augusta river stratified rocks also appear. New Guinea is poorer in mammalia than Australia and the Sunda Islands. The only mammals found there are the pig, dog, wallabi, cuscus, *Pteromys*, and a bush rat. The common dog is never met with wild, it is a delicacy to the natives, and is bred for their festive occasions. The dogs howl like the Australian dingo; they are small, short-haired, and have generally a spotted coat. Birds are numerous in species. Two new kinds of paradise birds were discovered. The cassowary is very frequently met with in the forests of the Augusta river, but seldom on the coast. Poisonous snakes are very few in number. No fatal accident through one of these reptiles was ever heard of. There is great abundance of fish along the coasts and in the rivers. Smoke-dried fish forms the chief food of the natives. The lower animal world, although numerously represented, appears to be a long way behind that of South America in abundance of forms and species; this is especially the case with regard to Coleoptera and Lepidoptera. Mosquitoes, which

on the coast and in the mountains are rarely seen, become on the Augusta river a terrible pest. The vegetable kingdom shows more affinity with that of the neighbouring islands than with Australia. Not a single species of eucalyptus has yet been found, and only one variety of acacia (in Australia there are about 300 varieties). The principal forms of vegetation are the forest trees and the grassy plains; besides these there are the mangrove, sago, bamboo, and sugar plantations. In the forests numerous varieties of palms are found, of the genera *Cocos*, *Kentia*, *Areca*, *Caryota*, *Euterpe*, &c. In dry places sometimes all monocotyledonous forms tend to disappear, and the tree-growth assumes the appearance of a European wood. Orchids, araceæ, pandanus, and ferns are plentiful. It is a very difficult and troublesome matter to force an entrance into the woods, especially into those of the plain. The grass plains are exceedingly monotonous; the most common grass is the allang-allang (*Imperata arundinacea*). The Papuans are of powerful, muscular, and handsome build, of medium height, with glossy skin of a chocolate-brown hue, and a wealth of crisp hair. Their eyes lie horizontally, and the base of their nose is comparatively small. Certain differences in food and modes of life cause modifications in this general type. Thus the natives of the Augusta river have well-developed upper, but weak lower extremities, because all their travelling is done in rowing boats. The natives of the hills have become very strong in their lower extremities, and they accomplish wonders in climbing the mountain slopes. Their physiognomy is very varied. At Astrolabe Bay one sees almost the Caucasian type of features, at Hatzfeldt Harbour the Semitic features prevail. It is impossible to discover anywhere a prominent characteristic of the natives. The husband engages in fishing and hunting as a sport; his only actual work is the felling of trees when clearing new plantations. All other hard work in the plantations and in the household falls to the lot of the wife, who nevertheless does not occupy a slavish position with regard to her spouse. The latter is in matters requiring decision often much more under the influence of his wife. The ordinary man has only one wife. The chiefs, on the other hand, have several. On the coast each family dwells in a separate house, but in the mountain villages, and especially in the upper valley of the Augusta river, several families occupy one house. The young men live together in one building, which is distinguished by a wooden figure of a man. The huts, which are composed of grass and sticks, rest either on the ground or on a foundation of wooden piles. The fortified abodes, which are made in the branches of lofty trees, often from 100 to 130 feet above the ground, are used as places of refuge when feuds arise. In the neighbourhood of Finsch Haven one finds in the villages also a two-storied house, called *lum*, into which the white man visiting the village is first of all conducted, and which serves as a meeting-place and council-chamber for the male adult portion of the population. The largest villages are found on the Augusta river, where villages containing more than 1000 inhabitants are by no means infrequent. A combination of villages into larger district confederations seldom takes place; the power of the village chief is very limited. Whereas in New Ireland men and women frequently go unclothed, and the men dye the hair of the pudenda white, yellow, or reddish-brown, Dr. Hollrung never saw in New Guinea a completely naked woman. Aprons made of grass are always worn. The clothing of the men is certainly often very imperfect. On the Upper Augusta river it consists, for example, of a tube of bamboo or rotang-threads covered over the end of the penis. Sometimes a broad piece of the bark of a *Ficus* is used as a loin-cloth. But beyond clothing the hips neither the men nor the women trouble themselves. On the other hand, very much importance is placed upon ornament, especially on the part of the men, who wear arm- and foot-rings, breast ornaments of cowrie-shells, earrings and frontlets, and stick

beautifully coloured flowers, hair-pins, and combs in their well-arranged hair. Intoxicating drinks are unknown to them. Tobacco and betel-chewing are their only means of enjoyment. Their principal working tool is the stone hatchet. For peeling bananas and yams, and for cutting up meat they frequently use a flat piece of bamboo, to which by taking away some of the interior parts they give an edge. Wars among the natives are not frequent. Their weapons are bows and arrows, spears and shields, sometimes also a sword made of palm-wood, and a fighting-wedge. For the chase they use also the net, trap-holes, and catch-huts. Fish are frequently speared at night by torchlight. The greatest difficulties in examining into the mental life of the inhabitants are presented by the incredible confusion of languages. Language-areas of 15 miles coast-length are very rare. These polyglot conditions explain very largely the difficulty experienced by exploring parties in advancing into the country.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

AFRICA.

Gold Coast.—Further Correspondence respecting the Affairs of the Gold Coast. (In continuation of [C.—4906] September 1886.) [C.—5357.] London, Eyre and Spottiswoode, 1888: folio, pp. vii. and 82, maps. Price 2s.

Meyer, [Dr.] Hans.—Zum Schneedom des Kilimandscharo. 40 Photographien aus Deutsch-Ostafrika mit Text. [Presented by Meyer's Bibliographisches Institut.]

The text of this publication gives a brief account of Dr. Meyer's journey from the coast to the top of Kilimayau. The photographs are most of them very beautiful, and really useful in conveying an idea of the different types of country with which they deal.

Mercier, Ernest.—Histoire de l'Afrique Septentrionale (Berberie) depuis les Temps les plus reculés, jusqu'à la Conquête Française (1830). Paris, Leroux, 1888: tome premier, 8vo., pp. xxv. and 444. Price 13s. (*Dulau.*)

While M. Mercier's learned and careful work is mainly historical, it will prove of service to any one studying the political geography of Northern Africa.

Sierra Leone.—Correspondence respecting the Recent Expedition against the Yonnie Tribe adjacent to Sierra Leone. (In continuation of [C.—5236] September 1887.) [C.—5359.] London, Eyre and Spottiswoode, 1888: folio, pp. viii. and 75, maps. Price 2s.

South Africa.—Further Correspondence respecting the Affairs of Pondoland. (In continuation of [C.—5022] of March 1887.) [C.—5410.] London, Eyre and Spottiswoode, 1888: folio, pp. iv. and 19, map. Price 9d.

Stevenson, James.—The Arab in Central Africa. Glasgow, J. Maclehose & Sons, 1888: 8vo., pp. 16, map.

[**Waller, Horace.**—On some African Entanglements. 8vo., pp. 8.

Relates mainly to the recent troubles at Lake Nyassa.

Wolf, [Dr.] L.—Die Erforschung des Sankuru. Abdruck aus Petermann's Mitteilungen, 1888, Heft vii., 4to., pp. 11, map.

Zululand.—Further Correspondence respecting the Affairs of Zululand and Adjacent Territories. (In continuation of [C.—5143] of August 1887.) [C.—5331.] London, Eyre and Spottiswoode, 1888: folio, pp. vii. and 90. Price 1s.

AMERICA.

Hettner, [Dr.] Alfred.—Reisen in den columbianischen Anden. Leipzig, Duncker and Humblot, 1888: pp. x. and 398, 8vo., map.

The little-known South American Republic of Colombia receives in the above an important and welcome addition to its very meagre geographical literature. Since the publication of Isaac Holton's 'New Granada: Twenty Months in the Andes,' in 1857, only one work of any importance—and that chiefly a compilation of older works—has been published: 'Etats Unis de Colombie,' Ricardo Pereira, Paris, 1883. A few monographs in the scientific journals on local and isolated tracts of the vast republic have from time to time thrown a little light on the country, and in the 'Tour du Monde' MM. Saffray and Ed. André have respectively in 1869 and 1875 described their journeys through Colombian territory; otherwise the grand old viceroyalty of New Granada is to the ordinary reader a sealed book. In the present volume Dr. Hettner publishes his travels in the Colombian Andes during 1882–1884. Entering in the usual manner at Barranquilla and ascending the river Magdalena to Honda, Bogotá is made the headquarters of a series of excursions. With the exception of a short trip to Manizales and the valley of the Cauca, just before it enters the Antioquia, a flying visit to the Llanos or plains of San Martín and the inevitable homage paid to the two Colombian lions, Tequendama Falls and the Bridge of Icononzo or Pandi, the most interesting portion of the work is that relating to the States of Boyacá and Santander. After visiting the principal towns and places of this, by far the most populous and wealthy district of Colombia, Dr. Hettner leaves the country by way of Cucuta and Maracaibo.

Considering the vast amount of ground gone over, the shortness of time, diversity of subjects, and the rather reduced size of the book, Dr. Hettner's remarks must necessarily be very condensed, and in details not always strictly correct. Everything seen and heard is done so from a German point of view, and unhappily Germany is brought in constantly by way of comparison, which, taking into account the peculiarities of race, climate, and topographical conditions, is scarcely fair, at least to Colombia. Not only are the places visited treated graphically as well as geologically, but the manners and customs, with just enough history to make them intelligible to the general reader, are described. These latter, together with the short dissertation on politics, are concise and to the point, and explain why Colombia, so favourably situated geographically, is lagging far behind her sister republics in commercial enterprise and the luxuries of modern civilisation.—[F. A. A. S.]

Moreno, Justo L.—Compendio de Geografía de Bolivia redactado para el uso de la juventud. Segunda Edición. Santiago, 1879: 12mo., pp. 248. [Presented by the Author.]

— Nociones de Geografía de Bolivia. Extractadas del Compendio de la misma materia aprobado por los Concejos Universitarios de los Distritos de Chuquisaca y la Paz. Sucre, Tip. de "El Cruzado," 1886: 12mo., pp. 68. [Presented by the Author.]

Oropeza, Samuel.—Intereses Nacionales. Cuestión de Límites entre las Repúblicas de Bolivia y del Perú. Sucre, Imp. Boliviana, 1888: sm. 8vo., pp. iv. and 128. [Presented by the Author.]

Rock, Miles.—Guatemala Forests. 'American Naturalist,' May 1888.

This is a valuable contribution to the physical geography of Guatemala, largely the result of the author's own observation.

Sievers, [Dr.] W.—Die Cordillere von Mérida nebst Bemerkungen über das Karibische Gebirge. Geographische Abhandlungen herausgegeben von Prof. Dr. Albrecht Penck. Wien, Eduard Hölzel, 1888: pp. viii. and 238, map.

Already in 1885 the first impressions of Dr. Sievers' travels through the Cordillera of Mérida were published, as a series of letters, in the Journal of

the Hamburg Geographical Society. The present volume is a laborious and scientific elaboration of the above, and is mainly devoted to the geographical and geological features of the country, which, extending from Pamplona in the Colombian Andes to Caracas, comprises nearly the whole of the extreme easterly offshoot of the Andes. This lofty and peculiar range, although scarcely known at present, was the principal scene of the early exploits of Ambrosio Alfinger, and the first Spanish conquerors on the Spanish Main. Dr. Sievers devotes a very short paragraph to the mineral resources of the Cordillera, and is sceptical as to the existence of gold. This must be a mistake, as certain districts are decidedly auriferous. Great attention is paid to the various heights and temperatures; these latter, owing to the want of lengthened meteorological observations, can only be approximate. A few statistics are found at the end of the volume, and a very useful geological chart with eleven cross-country sections.—[F. A. A. S.]

Wears, W. G.—The Prospects of Gold Mining in Venezuela. London, printed for private circulation by W. Wilfred Head & Mark [1888]: 8vo., pp. 58, plan. [Presented by the Author.]

AUSTRALASIA.

[**New Guinea.**]—Explorations and Adventures in New Guinea. By Captain John Strachan. London, Sampson Low & Co., 1888: 8vo., pp. xv. and 300. Price 12s. [Presented by the Publishers.]

In his volume Mr. Strachan, who has been known in New Guinea for some years as the master of small vessels engaged in the coast trade, gives an account of two voyages undertaken by him for the purpose of exploring the Mia Kasa river, in the Papuan Gulf, and of a third to the shores of MacLuer Inlet, in the north-west of the island. On his first journey Mr. Strachan reached the mouth of the Mia Kasa on the 7th of May, 1884. He ascended by easy stages, noting and naming, as he passed, the mouths of its tributary rivers (perhaps better called canals), for they are evidently only intersecting arms of the extensive delta of the Fly river), till on the 7th day out, he turned back towards the coast. In descending, he entered a large arm, which he has christened Prince Leopold river, running in a S.S.W. direction towards the sea. In essaying to pass down this estuary, he was scared by finding a large deserted native camp, and retreated hastily back to the main stream of the Mia Kasa with the intention of returning to Saibai for the purpose of "getting more men at any cost." In retreating he seems to have unwittingly thrown himself into the arms of those he was trying to escape; for in approaching the mouth of the Mia Kasa, he encountered a force supposed to be hostile, which his party were unable to intimidate by their arms or rockets, so that they were compelled to abandon their little vessel, the *Foi*, and make for the shore overland. After a difficult and dangerous march they reached the sea on the 2nd of June, when one of the party, named Scott, was drowned in attempting to swim over to the Island of Saibai for aid, which reached them the following day from the missionaries there in answer to their signal fires. This journey, therefore, occupied only twenty-six days. A second visit was paid in 1885 by Mr. Strachan to the same region in a small cutter, the *Herald*, which had, however, that almost indispensable accessory to profitable river exploration, a steam launch. On this occasion, entering by the more westerly, or Prince Leopold branch, the launch was navigated into the Mia Kasa as far as the 95 mile mark of the previous journey, to a river named the Wallace—stated on another page to be only 80 miles inland—where the author again turned back. It is to be regretted that he did not see his way to trace the river as far as it was possible, to discover whether or not it communicated with the Fly. His object in turning back was to carry out his intention of "confining his operations to a comprehensive exploration" of the island enclosed between the Prince Leopold and the main branch of the Mia Kasa, to which Mr. Strachan has given his own name, and which, after making excursions into it, contrary to the long accepted description of all this region by previous travellers as "half drowned," he describes as

"splendid country." His "work in this part of New Guinea being thus completed," he proceeded a little way farther east to the Katau river, whence he made short journeys into the interior. The country found there is also described in eulogistic terms. It is singular that Mr. Strachan ignores the journey of Dr. Macfarlane in 1873 up the Mia Kasa river, in the *Ellengowan* steamer, an account of which has been published in several journals. The chief addition therefore, to geographical science for which we are doubtfully indebted to Mr. Strachan's journeys, is the discovery of the Prince Leopold river. Many discrepancies occur between the text and the map of this region, which might have been obviated by careful revision, and for which probably the author ought not to be held responsible. Among others Mätä Kärä appears in the map as Mata Kaua; Gard river as Garde; Baibai tribe as Biabia; and Daubo as Däbu. The name of the Special Commissioner-designate for the New Guinea Protectorate is Dr. William Macgregor, C.M.G., not *Sir Robert*, as Mr. Strachan gives it.

Mr. Strachan's third journey to New Guinea was directed to MacIuer Inlet, and was to all appearance more of a trading than a geographical reconnaissance. Few discoveries of a very important kind were to be expected from so frequented a gulf, and Mr. Strachan makes none, with the exception of a surmise that a strait separates the main land from what he designates Berau Island. This supposition requires much confirmation, for Dr. Meyer having crossed from east to west in a more or less north-west course, ought surely to have traversed the channel if it had existed. On the contrary, he encountered land as high as 1200 feet. Rather more improbable is the author's belief that the Alice river, discovered by D'Albertis flowing into the Fly, flows also westward into the Arafura Sea, about the middle of the north-west coast.

We gather from the narrative that the author's relations with the natives were of a most unfortunate character both in the Papuan Gulf and in MacIuer Inlet. The exercise of a little more discretion and patience, we venture to think, might have resulted in a happier intercourse with his co-traders.

[—.] Mr. Theodore Bevan's Fifth Expedition to British New Guinea. Preliminary Presentation Pamphlet. By authority: Charles Potter, Government Printer [Sydney]. 1888.

This is an account reprinted from the Sydney *Daily Telegraph* of a supplementary journey made by Mr. Bevan to the rivers discovered by him the previous year. He does not seem to have ascended any of them to a higher point than he did the year before; but he has added considerably to the interminable network of intersecting canals into which the rivers Fly, Aird, and Aëvei (as the Queen's Jubilee ought perhaps to be called, as we shall presently point out) break up on the low swampy foreshore of the Papuan Gulf. The river banks are described; and several photographs of the people are reproduced.

On page 37 Mr. Bevan says that he traced the Queen's Jubilee and Douglas rivers a distance of nearly "100 miles inland." This statement evidently means by river windings, as nowhere on either river does his greatest distance from the coast exceed 46 or 47 miles. It is to be greatly regretted that the nomenclature of Captain Blackwood should have been ignored, and that the name of Aird, which has stood so long on our charts, should be renamed the Douglas. Equally to be deprecated is the giving of two names to one river, as we have in the Douglas, which in its upper waters bears the name *Philp* or *Burns*. The more important branch ought, in conformity with the nomenclature adopted in other regions, to be discarded, and the true name of Aird be applied to the river from its source to its embouchure. We are glad that Mr. Bevan has adopted this course with regard to the *Musgrave* and *Albert Victor Mountains*, which had long borne the name of *Arthur Gordon Range*. As to the disputed name for what Mr. Bevan calls the *Queen's Jubilee* river, one arm of which was christened by Mr. Chalmers several years before the *Wickham*, the difficulty of priority might easily be settled without offence to either explorer by giving it its native name of Aëvei river.

The pamphlet contains the official report of Mr. H. J. Hemmy, the sur-

veyor, to whom is due all the credit for the fixing of the positions, and on whom rests the responsibility for the accuracy of the map.

An appendix is added containing correspondence regarding the name of Queen's Jubilee river; also letters to H.M. Secretary of State, demanding a grant of 254,000 acres of land; on the ground, among others, of having "explored and accurately surveyed the main features of a territory equal in area to about *one-sixth* of the whole of New Guinea." Mr. Bevan must surely include in this all that fell within his vision. Lastly, there is given a correspondence which has passed between Mr. Bevan and the Special Commissioner, of a controversial character, bearing on the nomenclature of different features in the Papuan Gulf.—[H. O. F.]

GENERAL.

Dupont, E.—Société Belge des Ingénieurs et des Industriels. Conférence donnée à la Société le 29 Février 1888 par M. Edouard Dupont sur les Résultats de l'Exploration Scientifique qu'il a faite au Congo en Juillet - Décembre 1887. Bruxelles, 1888 : 8vo., pp. 18.

Fiorini, M.—Le Projezioni quantitative ed equivalenti della Cartografia. Roma, Presso la Soc. Geograf. Italiana, 1887 : 8vo., pp. 84. [Presented by the Author.]

Fischer, [Dr. Hans.]—Die Aequatorialgrenze des Schneefalls. 'Mittheilungen des Vereins für Erdkunde zu Leipzig,' 1887, pp. 99-274. Leipzig, 1888.

Dr. Fischer has done a service to physical geography in bringing together the data contained in his paper. So far as we know the subject has never been thoroughly worked out before. The limits with which he deals are the mean and extreme limits towards the Equator reached by snowfall each winter. He takes in succession the countries of Southern Europe, Northern Africa and Asia, North and Central America, the North Atlantic and North Pacific, South America, South Africa, Australia, the South Atlantic, South Pacific, Indian and Southern Oceans, and the Tropics, and brings together for each what data he can on which any conclusions can be based. The results are of much interest. Among other matters which Dr. Fischer discusses in conclusion are, the formation of snow, size of the flakes, snowfall without clouds, night frosts in South America, Australia, and Africa, and severe winters. Among other conclusions which he comes to is that a clear and satisfactory definition of the term "snow" is much wanted. The paper is accompanied by a map.

[**Gazetteer.**—The Pocket Gazetteer of the World : a Dictionary of General Geography. Edited by J. G. Bartholomew. London, J. Walker & Co. : pp. ix. and 630. Price 2s. 6d. [Presented by the Publishers.]

This handy and clearly-printed volume answers mainly the question "Where?" for 35,000 places. It is likely therefore to prove useful.

[**Guide for Travellers.**—Anleitung zu Wissenschaftlichen Beobachtungen auf Reisen in Einzel-Abhandlungen. . . . Herausgegeben von Dr. G. Neumayer, Direktor der Deutschen Seewarte. Zweite Auflage. Berlin, Oppenheimer, 1888 : 2 vols. 8vo., vol. i. pp. xiii. and 655 ; vol. ii. pp. 627. Price 34s. [Presented by Dr. Neumayer.]

It is fourteen years since the first edition of this standard guide for travellers was published. Since then a vast amount of exploring work has been done both by land and sea, and the horizon of observation has been considerably widened. In nearly all departments old methods have been improved and new methods have been devised. Fresh lines of observation have been opened up, especially in oceanography, new relations between various classes of phenomena have been suggested, and altogether the progress made rendered the first edition of Dr. Neumayer's valuable work to some extent out of date. The present edition may be taken as quite abreast of its time, and to any traveller who

knows German the work will be found a valuable guide. Dr. Neumayer has been assisted by many eminent specialists, each section being written by one who is master of his subject. In the first volume we have—Observations for Latitude and Longitude, F. Tietjen; Topographical and Geographical Surveying, W. Jordan; Geology, Baron von Richthofen; Terrestrial Magnetism, H. Wild; Meteorology, J. Hann; Observation of General Celestial Phenomena, E. Weiss; Nautical Surveying, P. Hoffmann; Tidal Observations, C. Börgen; River Observations, Dr. J. R. Ritter von Lorenz-Liburnau; Oceanography, O. Krümmel; Hydrographical and Magnetic Observations on board ship, Dr. Neumayer. In the second volume we have—Political Geography and Statistics, A. Meitzen; Medicine, Dr. A. Gärtner; Agriculture, A. Orth; Agricultural Plants, L. Wittmack; Botanical Geography, O. Drude; Geographical Distribution of Sea-weeds, P. Ascherson; Collecting and Preserving Phanerogams, Dr. Schweinfurth; Ethnology, Dr. Bastian; Linguistics, H. Steinthal; Reckoning, H. Schubert; Anthropology and Prehistoric Researches, Dr. Virchow; Mammals, R. Hartmann; Whales, H. Bolau; Birds, Dr. Hartlaub; Reptiles, Batrachia, and Fishes, Dr. Günther; Mollusca, Ed. Von Martens; Invertebrate Sea Animals, Prof. K. Möbius; Articulata, A. Gerstäcker; The Use of the Microscope and of Photographic Apparatus, G. Fritsch. The work is well provided with illustrations and maps.

Jordan, William Leighton.—The Standard of Value. Fifth Edition. London, Longmans & Co., 1888: 8vo., pp. 179. Price 6s. [Presented by the Publishers.]

Karpinsky, A.—De la régularité dans la Configuration et la Structure des Continents. 'Bull. de l'Académie Impériale des Sciences de St. Pétersbourg,' tome xxxii. pp. 157-173, 1888.

Monaco, [Prince] Albert de.—Sur une expérience entreprise pour déterminer la direction des courants de l'Atlantique Nord. Deuxième campagne de l'*Hirondelle*. [Paris, Gauthier-Villars, 1886]: 4to., pp. 3.

— Deuxième campagne scientifique de "l'*Hirondelle*" dans l'Atlantique nord. Extrait du Bulletin de la Société de Géographie (4^e trimestre, 1887), 8vo., pp. 16, map.

— Sur la troisième campagne scientifique de l'*Hirondelle*. [Paris, Gauthier-Villars, 1887]: 4to., pp. 4.

Penck, [Prof. Dr.] Albrecht.—Die Bildung der Durchbruchthäler. Wien, 1888: 8vo., pp. 52. [Presented by the Author.]

This is a lecture delivered recently by Dr. Penck. After referring to the old notion of valleys being mostly caused by the washing-out force of water, he speaks of the service done to geography by Humboldt and others, who insisted on the existence of valleys that had been broken through or across mountain ranges, as it were ("Durchbruchthäler"), by the continuous action of rivers. It is this class of valley in its various aspects throughout the world that Dr. Penck considers in his most instructive lecture.

Pierce, Josiah, Jun.—The Economic Use of the Plane-table in Topographical Surveying. With an Abstract of the Discussion upon the paper. London, 1888: 8vo., pp. 72, plate. [Presented by the Author.]

Ratzel, [Dr.] Friedrich.—Völkerkunde. Leipzig, Verlag des Bibliographischen Instituts, 1887-8, 3 vols. Vol. i. Die Naturvölker Afrikas, pp. x. and 680; vol. ii. Die Naturvölker Ozeaniens, Amerikas und Asiens, pp. x. and 815; vol. iii. Die Kulturvölker der Alten und Neuen Welt, pp. viii. and 778. Price for each vol., 16 marks.

As a general reference book on ethnology, this work will probably supersede all others, at least for purposes of accurate geography. Professor Ratzel

occupies the highest rank as a geographer, and he may be said to have been the creator of the department of anthropogeography. No one is better qualified than he to bring together in orderly arrangement what is known about the various races of mankind. He has been collecting his materials for years, and the result is nearly all that could be desired. No doubt there is room for criticism in detail, but as a whole it may be accepted as the most satisfactory work of its kind. There are hundreds of illustrations, many of them coloured, selected in the main with real discrimination, and executed with the greatest care.

Stephen, Leslie.—*Dictionary of National Biography*, vol. xv. Diamond—Drake. London, Smith, Elder & Co., 1888: 8vo., pp. vi. and 454. Price 15s.

To this volume is appended an Index; which addition will be made to each future volume.

Strachey, [Lieut.-Gen.] R.—*Lectures on Geography*. Delivered before the University of Cambridge during the Lent Term 1888. London, Macmillan & Co., 1888: 8vo., pp. 211. Price 4s. 6d. [Presented by the Publishers.]

Thompson, William Mann.—*Improved Systems of Chaining or Land and Engineering Surveys*. London, 1888: 8vo., pp. 22.

White, Charles A.—*Mountain Upthrusts*. 'American Naturalist,' May 1888.

Certain upthrusts of the western portion of the United States exhibit in a clear and striking manner the evidence that they have originated in uplifted folds of the earth's crust. One of the simplest and most characteristic of these orogenic folds is that in which the Uinta range of mountains originated. Other uplifts of a similar character have occurred, but, Mr. White states, having been of limited longitudinal as well as lateral extent, have resulted in comparatively small clusters of mountains, and not in mountain ranges proper. The Black Hills of Dakota have originated in one of these circumscribed uplifts. In North-western Colorado two uplifts occur, which, so far as the character of the displacement and of the formations involved are concerned, are similar to those which have been referred to; but they have occurred within such narrow limits, respectively, that they have each resulted in only a single mountain. The limits of each of these uplifts are so sharply defined, and the amount of vertical displacement of the strata involved is so great, that Mr. White designates them as upthrusts. A description of them is the special object of his article, but as they are structurally connected with the great Uinta field and with other neighbouring displacements, he devotes a considerable part of his article to the description of them also. The article is accompanied by several instructive illustrations.

The following works have also been added to the Library:—

Drayton, Michael.—*Poly-Olbion*. With continuation. 3 vols. 1622 [1876].

Kay, Stephen.—*Travels and Researches in Caffraria: describing the Character, Customs, and Moral Condition of the Tribes inhabiting that portion of Southern Africa: with historical and topographical remarks illustrative of the state and prospects of the British Settlement in its borders, the Introduction of Christianity, and the Progress of Civilization*. London, John Mason, 1833: 8vo., pp. xvi. and 509, map and plates.

Kennedy, [Capt.] J. Clark.—*Algeria and Tunis in 1815. An Account of a Journey made through the two Regencies by Viscount Feilding and Captain Kennedy*. 2 vols. London, H. Colburn, 1816: 8vo., pp. (vol. i.) xi. and 304; (vol. ii.) vii. and 261, 1 plates.

Lacouperie, [Prof.] A. Terrien de.—The Old Numerals, the Counting-Rods and the Swan-Pan in China. London, 1883: 8vo., pp. 44. [Presented by the Author.]

— The Yueh-ti and the Early Buddhist Missionaries in China. From 'The Academy,' Dec. 31, 1887: 12mo., pp. 8.

— Did Cyrus introduce writing into India? London, D. Nutt, &c.: 8vo.

— The Sinim of Isaiah not the Chinese. London [1887]: 8vo.

— The Miryeks or Stone-Men of Corea. With a plate. Hertford, S. Austin & Sons, 1887: 8vo., pp. 7.

— The Old Babylonian Characters and their Chinese Derivates. London, D. Nutt and Trübner & Co., 1888: 8vo., pp. 27.

[The above five pamphlets were presented by the Author.]

M'Cormick, [Deputy Inspector-General] B.—Voyages of Discovery in the Arctic and Antarctic Seas, and Round the World: being personal narratives of attempts to reach the North and South Poles; and of an Open-Boat Expedition up the Wellington Channel in search of Sir John Franklin and Her Majesty's ships "Erebus" and "Terror" in Her Majesty's boat "Forlorn Hope," under the command of the Author. To which are added an autobiography, appendix, portraits, maps, and numerous illustrations. London, Sampson Low & Co., 1884: 2 vols. large 8vo., pp. (vol. i.) xx. and 432; (vol. ii.) xii. and 412. Price 5s. 6d.

Morgan, J.—A Complete History of Algiers. To which is prefixed, an Epitome of the General History of Barbary, from the earliest Times: interspersed with curious Remarks and Passages, not touched on by any Writer whatever. 2 vols. in 1. London, Printed by J. Bettenham, 1728–1729: 4to., pp. vi., xxix., and 680.

Mott, Albert J.—Notes on Easter Island: a paper read before the Literary and Philosophical Society of Liverpool, March 21st, 1881: 8vo., pp. 33. [Presented by the Author.]

Muller, Hendrik P. N.—Herinneringen uit Afrika. Fragment van een Reisverhaal. Natal. Overgedrukt uit het Algemeen Handelsblad, 1888, 12mo., pp. 97.

Ookley, Simon.—An Account of South-west Barbary: containing what is most Remarkable in the Territories of the King of Fez and Morocco. Written by a Person who had been a Slave there a considerable Time; and Published from his Authentick Manuscript; To which are Added, Two Letters: One from the Present King of Morocco to Colonel Kirk; The Other to Sir Cloudeasy Shovell: With Sir Cloudeasy's Answer, &c. London, 1713: 12mo., pp. xxxi. and 152, map.

Pallmen, Ignaz.—Beschreibung von Kordofan und einigen angränzenden Ländern nebst einem Ueberblick über den dasigen Handel, die Sitten und Gebräuche der Einwohner und die unter der Regierung Mehemed Ali's stattgefundenen Sklavenjagden. Stuttgart and Tübingen, J. G. Cotta, 1843: 8vo., pp. xii. and 220.

Report on the Zoological Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. *Alert*, 1881–2. London, 1884: 8vo., pp. xxv. and 684, plates. [Presented by the Trustees of the British Museum.]

Ribeiro, Manuel Jeneira.—A Colonisação Luso-Africana, Zona Occidental. Lisbon, Lallemand, 1884: 8vo., pp. lv. and 250. Price 10s. (*Dulau*.)

This is a very complete study of Portuguese West Africa, especially from the point of view of colonisation.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

ORDNANCE SURVEY MAPS.

Publications issued during the month of July 1888.

1-inch—General Maps:—

ENGLAND AND WALES: New Series. Sheet 335, Outline, 1s.

SCOTLAND: Sheet 92, hills shaded, 1s. 9d.

6-inch—County Maps:—

ENGLAND AND WALES: **Anglesey**: 3 N.E., 18 S.W.; 1s. each. **Brecknockshire**: 3 N.W., N.E., S.W., S.E., 11 N.W., 12 N.W., 41 N.W., 47 N.W., 1s. each. **Cambridgeshire**: 60 S.E., 1s. **Cardiganshire**: 23 N.W., N.E., S.W., S.E., 1s. each. **Cornwall**: 13 S.W., and 19 N.W., on one sheet, 19 N.E., S.E., 20 N.W., S.W., 33 N.W., 41 S.W., 48 S.E., 56A, S.E., 57 S.E., containing Truro, 58 S.W., S.E., 60 S.W., and 66A, N.W., on one sheet, 63 S.W., containing Camborne, 66 N.E. and S.E. on one sheet, 70 S.W., 72 S.W., and S.E. on one sheet, 75 N.W., 76 N.E., S.E., 1s. each. **Devonshire**: 54 N.E., 121 N.W., containing Totnes, 121 S.W., 1s. each. **Dorsetshire**: 28 N.E., 46 S.W., S.E., 52 N.W., 55 S.W., 57 S.W., 1s. each. **Herefordshire**: 5 N.E., 10 N.W., 49 N.E., 55 N.W., 1s. each. **Lincolnshire**: 66 S.E., 104 S.E., 105 S.E., 106 S.W., 115 S.W., S.E., 118 S.W., 1s. each. **Merionethshire**: 26 N.E., 32 N.W., 33 N.E., S.E., 36 N.E.; 1s. each. **Pembrokeshire**: 14 S.E., 23 N.W., S.E., 28 N.W., 29 S.E., 1s. each. **Radnorshire**: 17 N.E., S.W., S.E., 18 N.E., S.W., 25 N.W., 32 N.W., 1s. each. **Shropshire**: 37 N.E., 1s. **Staffordshire**: 13 N.E., S.E., 19 N.E., S.W., S.E., 1s. each. **Suffolk**: 88 S.E., 1s. each.

25-inch—Parish Maps:—

ENGLAND AND WALES: **Brecknockshire**: XIII. 7, 8; XIV. 3; XX. 2, 6; XXIII. 3; XXIV. 1, 5, 13, 14; XXVIII. 1, 6, 3s. each. **Cambridgeshire**: XXX. 12, 4s.; XXXII. 10, 13, 15; XXXIV. 9, 3s. each; XXXIV. 10, 5s.; XL. 2, 13, 3s. each. **Cardiganshire**: VI. 2, 3s. **Car-marthenshire**: IX. 2, 3, 14; X. 7, 8; XI. 13, 3s. each. **Devonshire**: XII. 12; XX. 1, 2, 15; XXI. 1; LXV. 2, 5, 8, 9; CXXVII. 3, 4, 10, 3s. each. **Dorsetshire**: X. 1, 6; XXIV. 5, 3s. each; XXIV. 7, 6s.; XXIV. 13, 3s.; XXV. 4, 4s.; XXVI. 1; XXXIII. 15; XXXIV. 2, 5, 9, 3s. each. **Herefordshire**: XXXVII. 1, 5, 10, 14, 3s. each. **Huntingdonshire**: XVII. 2, 5, 6, 8, 11, 12, 15; XVIII. 1, 3, 8; XIX. 1, 6, 9; XXI. 7, 10; XXII. 10, 13, 15; XXV. 3, 16, 3s. each. **Lincolnshire**: XXX. 5, 6, 9, 10, 11, 16; XXXIX. 2, 8, 12, 14, 15, 16; XLVII. 13; LXXIV. 3, 4, 9, 11, 3s. each; LXXIX. 1, 4s.; LXXIX. 14, 3s.; LXXX. 15, 4s.; LXXXII. 2; XC. 5, 6, 7; XCVII. 16; CXIII. 6; CXXII. 11, 15; CXXV. 1, 2, 3, 4; CXXXVI. 1, 2; CXXXIX. 3; CXXXIX. 4, 7, 8, 3s. each; CXXXIX. 11, 4s.; CXXXIX. 12, 16; CXL. 2; CXLIV. 6, 3s. **Somersetshire**: XIV. 2, 6s.; XXXVI. 13, 4s.; XXXVI. 15, 3s.; XLI. 12, 5s.; XLVIII. 2, 4s.; LXXX. 12, 14, 3s. each. **Suffolk**: Area Books: Capel St. Mary, Freckenham, Washbrook, Worlington, 1s. each. **War-wickshire**: IX. 10; X. 15, 3s. each; XVI. 1, 4s.; XVI. 4, 11, 3s. each; XVI. 12, 4s.; XVII. 7, 3s.; XVII. 9, 4s.

Town Plans—10-feet scale:—

ENGLAND AND WALES: Atherstone, VI. 11, 17; 2s. Cambridge, XL. 14, 24, 25; 3s. each. XLVII. 2, 19; 4s. XLVII. 2, 4, 5, 14, 15, 18; XLVII. 6, 4; 5s. each. XL. 14, 23; XLVII. 2, 3, 8, 17, 23, 24; 6s. 6d. each. XLVII. 2, 7, 11s. 6d. Dartmouth, CXXVII. 16, 10; 2s. **Horncastle**, LXXIII. 10, 25; LXXIII. 11, 21; 2s. each. Taunton, LXX. 7, 25; LXX. 8, 14, 17, 22, 23; LXX. 11, 10, 14, 15, 19, 24, 25; LXX. 12, 3, 7, 8, 9, 12, 14, 17, 24; LXX. 16, 2; 2s. each.

Miscellaneous:—

Sanitary District Diagrams for the following Counties are now ready, price 6d. each: Bedfordshire, Brecknockshire, Buckinghamshire, Cardiganshire, Carmarthenshire, Cornwall, Denbighshire, Glamorganshire, Huntingdonshire, Merionethshire, Montgomeryshire, Northumberland, Pembrokeshire, Radnorshire, and Rutland.

(Stanford, Agent.)

AFRICA.

Kassai.—Le — et la Louloua de Kwamouth à Louebo, levés à bord du Steamer "Stanley" par le capitaine Thys, officier d'ordonnance de S.M. le Roi des Belges. Scale 1:200,000 or 2·7 geographical miles to an inch. Bruxelles, Institut National de Géographie, 1888. (*Dulau.*)

This chart has been specially constructed for the use of steamers, and also to give an approximately accurate idea of the configuration of the river banks, and some details as to the country in the immediate vicinity of the Kassai. In mapping the river, Captain Thys has not recorded any soundings when the depth of water was more than 10 feet, and it is not until he begins to ascend the Lulua that any figures are given; thus, in an expedition extending over 112 miles, we have only 31 miles on which the depth of the water is marked. Throughout the map marginal notes descriptive of the country are given, which will not only be useful to those who may hereafter navigate the Kassai and Lulua rivers, but which also contain information that will be interesting to the geographer.

Süd Afrika.—Geologische Skizze von —. Von Dr. N. Schenck. Scale 1:10,000,000 or 137 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1888, Tafel 13. Gotha, Justus Perthes. (*Dulau.*)

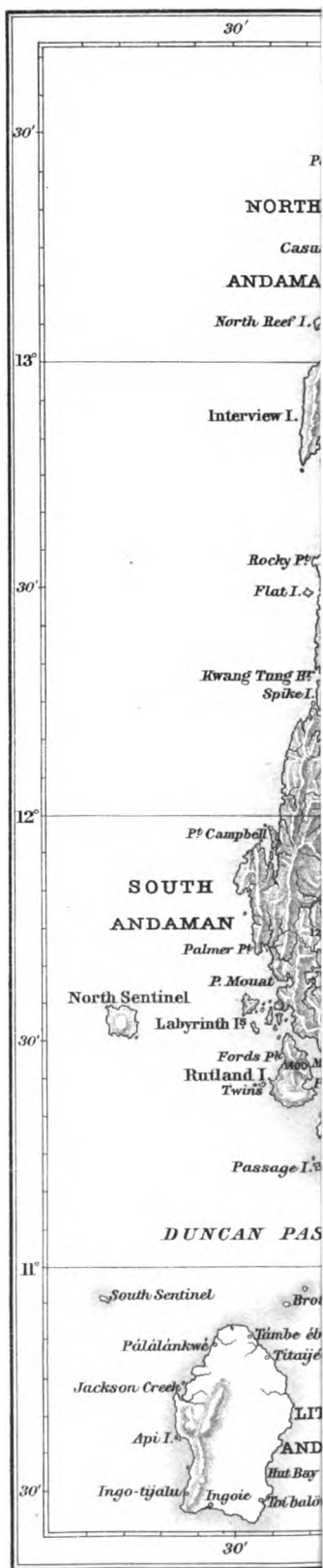
Togo-Land.—Das Gebiet der Ewe-Stämme und die Deutschen Erwerbungen im —. Nach den neuesten z. T. handschriftlichen Quellen entworfen u. gezeichnet von Dr. B. Hassenstein. Scale 1:750,000 or 10·3 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1888, Tafel 14. Gotha, Justus Perthes. (*Dulau.*)

CHARTS.

Service Hydrographique de la Marine, Paris.—No. 4209. Côte Ouest de France. Rivière de Crach. 1887.—No. 4231. Mer de Chine. Golfe du Tonkin. Chenaux Intérieurs de l'Archipel des Fai-Tsi-Long au Sud de l'île du Colosse et de Pate-Ha-Mun. 1887.—No. 4249. Mer de Chine. Golfe du Tonkin. Archipel des Fai-Tsi-Long. Chenaux Intérieurs de la Baie d'Ha-Long à Ké-Bao. 1887.—No. 4230. Mer de Chine. Golfe du Tonkin. Côtes Nord du Tonkin entre Kebao et Tsieng-Mui-Tao. 1887.—No. 4128. Tunisie. Golfe de Tunis. La Goulette. 1886.—No. 4129. Tunisie. Du Cap Serrat au Cap Blanc. Anses Serrat et Dukara. 1887.—No. 4208. Tunisie. De Ksar Menara à Sousse. 1887.—No. 4219. Tunisie. Du Cap Roux au Cap Serrat. Tabarca et Cap Négro. 1887.—No. 4222. Tunisie. Du Cap Kamart au Ras-al-Fortas. Baie de Tunis. 1887.—No. 4227. Tunisie. Du Ras Dimas au Ras Kapudia. 1887.—No. 4226. Tunisie. Du Ras Marsa au Ras Dimas. Golfs de Sousse et de Monastir 1887.—No. 4186. Océan Atlantique. Ouest d'Afrique. Croquis de la Baie de Mossamédès. 1887.—No. 4282. Côte Occidentale d'Afrique. Rivière Muniy. 1888.—No. 4283. Côte Occidentale d'Afrique. Gabon. Croquis des Rivières de l'Estuaire. 1888.—No. 4284. Baie du Cap Lopez et Croquis du Bas Ogowe. 1888.—No. 4285. Côte Occidentale d'Afrique. Croquis de l'Ogowe de N'Gubué à Lambarené. 1888.—No. 4286. Côte Occidentale d'Afrique. Croquis de l'Ogowe de Lambarené à N'Djole et du Cours de la Rivière N'Gunie. 1888.—No. 4287. Côte Occidentale d'Afrique. Fernand Vaz. Croquis de l'Eliva N'Komi et du Pays de Kama. 1888.—No. 4293. Océan Pacifique Sud. Archipel des Nouvelles Hébrides. Ile Vate ou Sandwich. 1887.—Service Hydrographique de la Marine, Paris.

Berghaus' Physikalischer Atlas (begründet 1836 von Heinrich Berghaus).—75 Karten in sieben Abteilungen, enthaltend mehrere hundert Darstellungen über Geologie, Hydrographie, Meteorologie, Erdmagnetismus, Pflanzenverbreitung, Tierverbreitung und Völkerkunde. Vollständig neu bearbeitet und unter Mitwirkung von Dr. Oscar Drude, Dr. Georg Gerland, Dr. Julius Hann, Dr. G. Hartlaub, Dr. W. Marshall, Dr. Georg Neumayer, und Dr. Karl v. Zittel. Herausgegeben von Prof. Dr. Hermann Berghaus. Sechszehnte Lieferung. Inhalt: Nr. 6. Gletscherkarte. Nr. 66. Völkersitze um 1500 und 1880. Nr. 69. Süd-Ost-Asien: Übersicht der sesshaften Bevölkerungen um 1880. Gotha, Justus Perthes, 1888. Price 3s. (*Dulau.*)

Sheet 6 contains twenty-one maps of some of the principal glaciers of the world. On sheet 66 two maps of the world are given, exhibiting the changes in the localities of population which have taken place during the three centuries which elapsed between 1500 and 1800. Sheet 69 is an ethnographical map, showing the locations and extent of the stationary population of south-eastern Asia.



Y.

yal Geo-
AUGHTON,
ing and
trachan,
, F.R.S.,
Anthro-
Medical
ment.—
Price,
w, W.;

of the
tion of

nomical
eology,
of the
, Kew.
rations

or and

society.

Biblio-
C.S.I.,

have Vol. I.

Y.

yal Geo-
AUGHTON,
ing and
trachan,
, F.R.S.,
Anthro-
-Medical
ment.—
Price,
w, W.;

of the
tion of

nomical
eology,
of the
, Kew.
rations

or and

ociety,

Biblio-
C.S.I.,

ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by **Colonel H. H. Godwin-Austen, F.R.S., J. K. Laughton, M.A., and Douglas W. Freshfield, M.A.** Contents: Hints on Surveying and Astronomical Observations. **John Coles, F.R.A.S.**—Meteorology. **R. Strachan, F.M.S.**—Geology. **W. T. Blanford, F.R.S.**—Natural History. **H. W. Bates, F.R.S., Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.**—Anthropology. **E. B. Tylor, D.C.L., F.R.S.**—Photography. **W. F. Donkin, M.A.**—Medical Hints. **G. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department.**—General Outfit. **Colonel J. A. Grant, C.B., Edward Whymper, and others.** Price, in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, W.; and to be had of **Edward Stanford, 55, Charing Cross, S.W.**

Instruction for **Intending Travellers**, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. **Surveying and Mapping**, including the fixing of positions by Astronomical Observations. By **Mr. John Coles**, Map Curator of the Society. 2. **Geology**, including practical training in the field. By **Mr. W. Topley, F.R.S.**, of the Geological Survey. 3. **Botany**. By **Mr. N. E. Brown**, of the Herbarium, Kew. 4. **Photography**. By **Mr. John Thomson**, Author of 'Photographic Illustrations of China and its People,' and other works.

The lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2s. 6d.

Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers, Vol. II. Part 2.—Now Ready.—CONTENTS:—A Bibliography of Algeria. By **Lieut.-Colonel Sir Robert Lambert Playfair, K.C.S.I., H.M. Consul-General, Algiers.**

* * * Fellows who have not applied for the Parts as published, can have Vol. I. complete by applying at the offices of the Society, 1 Savile Row, W.

LIMMER'S HOTEL, CONDUIT STREET, W.

This old-established Hotel, situated in the centre of the most fashionable part of London—being mid-way between Bond Street and Regent Street—contains every convenience for the accommodation of **FAMILIES** and Gentlemen.

The Banqueting Hall is specially adapted for Military and other Dinners, and Wedding Breakfasts.

Address—**THE PROPRIETOR.**

DEDICATED BY SPECIAL PERMISSION TO HER MAJESTY.

NEW EDITION, with Additional Maps of Western Canada and Mexico. Imperial folio, half bound in russia or morocco, with gilt titles and edges, price 6l. 6s.; full bound, russia or morocco, gilt, price 10l. 10s. (to order).

THE ROYAL ATLAS OF MODERN GEOGRAPHY.

By A. KEITH JOHNSTON, LL.D., F.R.G.S.

With Additions to the Present Time. In a Series of Fifty-four entirely Original and Authentic Maps, Coloured in Outline.

With a Complete Index of easy reference to each Map, comprising over 176,500 Places contained in the Atlas.

"Since this fine atlas was issued sixteen years ago it has had no rival in England, and certainly no superior. It was then, and is still, a credit to British cartography."—*Times*.

Complete Catalogue of Atlases, &c., free on application.

W. & A. K. JOHNSTON (Established 1825), Edina Works, Easter-road, Edinburgh; and
5, White Hart-street, Warwick-lane, London, E.C.

LIEBIG COMPANY'S
EXTRACT
OF MEAT

Justus von Liebig

•• Ask for the **COMPANY'S EXTRACT**,
and see that it bears **JUSTUS VON LIEBIG'S**
SIGNATURE IN BLUE INK across the Label.

VOL. X., No. 10.
New Monthly Series.]

OCTOBER, 1888.

[To Non-Fellows,
PRICE 1s. 6d.]

OCT 20 1888

PROCEEDINGS

OF THE

Royal Geographical Society

AND

Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE		PAGE
ACCOUNT OF CHRISTMAS ISLAND, INDIAN OCEAN. By Captain W. J. L. WHARTON, R.N., F.R.S., Hydrographer to the Admiralty	613	THEIR CONSEQUENCES. Translated by Miss M. B. HAY, of Tashkent	638
ON THE NEW LAKE BETWEEN KÖM AND TEHERÂN. By H.M. The SHAH OF PERSIA	624	GEOGRAPHICAL NOTES	646
THE BANTU BORDERLAND IN WESTERN AFRICA. By H. H. JOHNSTON, H.M. Vice-Consul, Cameroons.	633	CORRESPONDENCE	652
THE EARTHQUAKES OF MAY AND JUNE, 1887, IN THE VERNY (VERNOE) DISTRICT, RUSSIAN TURKESTAN, AND		PROCEEDINGS OF THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIATION. BATH MEETING	654
		NEW GEOGRAPHICAL PUBLICATIONS	668
		NEW MAPS	673

MAPS.

LAKE OF SAVAH AND NEIGHBOURHOOD	676
CAMEROONS DISTRICT (ETHNOLOGICAL MAP)	676

LONDON: EDWARD STANFORD, 26 & 27, COCKSPUR STREET, CHARING CROSS, S.W.
 PARIS: ANDRÉNEAU-GOÛJON.
 VIENNA: ARTARIA & Co.
 HAMBURG: L. FRIEDRICHSEN & Co.
 ST. PETERSBURG: WATKINS & Co.
 MANCHESTER: JOHN HEYWOOD.
 EDINBURGH: DOUGLAS & FOULIS.
 DUBLIN: HODGES, FOSTER & Co.
 BERLIN: D. REIMER.
 LEIPZIG: F. A. BROCKHAUS.
 NEW YORK: SCHUBNER & WELFORD.
 PHILADELPHIA: LIPPINCOTT & Co.
 MELBOURNE: GEORGE ROBERTSON & Co
 LIMIT

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA.....	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO.....	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR.....	"
KURRACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

LIEBIG COMPANY'S EXTRACT OF MEAT

J. Liebig

*** Ask for the COMPANY'S EXTRACT,
and see that it bears JUSTUS VON LIEBIG'S
SIGNATURE IN BLUE INK across the Label.

LUXURIANT GLOSSY HAIR

Is assured to those who discard poisonous hair restorers and dyes and cheap oils,
which produce eruptions on the scalp, and use

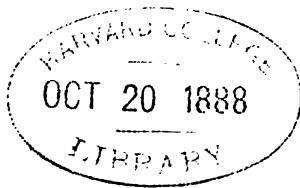
ROWLANDS' MACASSAR OIL,



Known for nearly 100 years as the best Preserver and Beautifier of the Hair.
It contains no lead or mineral ingredients, and can now also be had in a
GOLDEN COLOUR for fair-haired children.

Sizes, 3s. 6d., 7s., 10s. 6d. (Family bottles equal to 4 small).

Ask Chemists for ROWLANDS', and avoid cheap worthless imitations under similar names.



PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY

AND MONTHLY RECORD OF GEOGRAPHY.

Account of Christmas Island, Indian Ocean.

By Captain W. J. L. WHARTON, R.N., F.R.S., Hydrographer to the Admiralty.

(Read at the Evening Meeting, June 25th, 1888.)

I PROPOSE to give you a short account of an island that presents some rather unusual peculiarities, and is particularly interesting from the point of view of its geological construction, and of the operations at work during long ages.

Lying some 200 miles south of the western end of Java is an island that goes on our charts and maps by the name of Christmas Island, though how and when it got its name I have been unable to discover. Though its position is such that it is frequently sighted by some of the numerous vessels passing through the Strait of Sunda, it may be said that until last year absolutely nothing was known of it. On an old Dutch map of 1666 by one Pieter Goos it is called Moni. Later charts and maps call it indifferently Moni or Christmas, under the different forms of Natividad, Isle de Noel, according to the nationality of the map-maker.

The earliest mention of it with any circumstance is in old Dampier, who called off the island in 1688. He evidently knew nothing of it, for he was trying to reach the Keeling Islands, and mentions sighting this island unexpectedly. He calls it by no name, but sailed in near it, and sent a boat in for a tree to make a pump, and to look for water; but though he says they saw a stream on the south-western side of the island, they were unable to approach it on account of the sea. His carpenters cut a tree, and brought the boat back full of frigate birds, boobies, and land crabs. Of the latter he says, "They were very good sweet meat, and so large that two of them were more than a man could eat, being almost as thick as one's leg."

Since then no description can be found of it, and beyond the very apparent fact of its being high and wooded, no record could be found of its ever having been examined, except that in 1771 an English East
No. X.—Oct. 1888.]

Pigot had been evidently but of a perfunctory nature. It appeared a disgrace that no accurate knowledge of this island should be forthcoming, and the Admiralty therefore in 1886 directed H.M. surveying vessel *Flying Fish*, Captain Maclear, to call at the island on her way home from Australia and gain some knowledge of it.

The *Flying Fish* approached the island from the north in December, and on getting within a few miles saw a white fringe of reef apparently beating against the very shores of it. A still nearer approach revealed low cliffs undermined by the water, and forbidding any hope of landing. No sign of bottom was found until close to the coast, when 115 fathoms was struck. The ship steamed round to the eastward, and so round the island; everywhere the same aspect was found. At the sea-level were cliffs from 30 to 100 feet in height, undermined by the sea, and quite unapproachable for the purpose of landing. Behind them rose the slopes of the island, covered with dense forest, amongst which ranges of cliff appeared at different altitudes here and there. Little or no coral reef was seen, and in many places the water was deep close up to the cliffs.

At length a small beach to the eastwards of the north-west point was seen, but no anchorage was found off it. When, however, the circumnavigation of the island was nearly completed, a small bay with a white beach was found a little west of the north point, and here, after an examination by the boats, the ship crept in and managed to find a spot to drop her anchor in deep water, securing her stern to a tree on the beach. On landing it was soon found that any exploration would be arduous, and occupy much time. The jungle was dense, and a few hundred yards back a lofty cliff apparently barred all further progress. As the island was plainly useless for ordinary naval purposes, and his time was limited, Captain Maclear contented himself with making a plan of the bay, which he named *Flying Fish Cove*, and collecting what animal life he could find. Most numerous were the large robber-crab, the *Birgus Latro*, and a rat which appeared to swarm everywhere. A large species of fruit-eating pigeon was also seen in great numbers.

Captain Maclear landed some fowls, but as he remarked that the crabs began at once to chase them, he did not expect them to prosper, an expectation which seems unfortunately justified by the subsequent visitors seeing nothing of them.

Captain Maclear's running survey showed the island to be an irregular quadrilateral, about nine miles from north to south, and the same from east to west, with gently sloped hills on all sides without defined peaks. The summit was a double round-topped elevation on the north-western part, about 1200 feet in height. The island is densely wooded all over, except where the cliffs are too steep to allow anything to grow.

No running water was seen, but the rainfall must be heavy. It was raining during a great part of the *Flying Fish's* visit, clouds being con-

tinually formed over the island from the moist air driven up the sides by the wind. Thus the great amount of water deposited must be mostly absorbed by the soil and porous rock. Holes in the rocks here and there were found full of water.

Captain Maclear's collection was received at the British Museum with much interest. The majority of the specimens were new to science, and seemed to promise much more of a like nature on a larger and closer search. From a geological point of view also the island seemed of interest. The shore cliffs turned out to be of coral rock, the inner cliff, which prevented further advance inland, was also of coral, and nothing but coral rock was seen anywhere.

An opportunity afforded by the fact that another surveying ship, the *Egeria*, Captain Pelham Aldrich, would pass not far from Christmas Island was therefore seized, and a further examination of the island was directed.

The *Egeria* secured herself, on 30th September, 1887, in the same precarious position as before occupied by the *Flying Fish*. As Captain Aldrich had been enjoined to endeavour to reach the summit of the island if possible, he had before anchoring successfully landed a party under Lieutenants Marescaux and Monro at the small beach near the north-west point, which was nearly under the summit.

The exploration of the island at once commenced. To give you an idea of its character, I cannot do better than quote from Captain Aldrich's account of his ascent of the island on the day after his arrival.

"As soon as the steam pinnacle was ready, I started in her with my cookswain, and passed close along the coast between Flying Fish Cove and the north-west beach, on which the party were landed yesterday.

"The shore-line is all steep cliff, much underworn by the action of the sea; the height varies on the north-western face from 38 to 55 feet, as measured in different places. In other parts, as on the south-eastern side, the sea cliffs are quite 100 feet high. The height of the underworn portion is much beyond the sea-level, and in one place, not far from Rocky Point, where I measured it on a subsequent occasion, it was $11\frac{1}{2}$ feet above the water, and the depth inward from a vertical line at the edge of the overhanging portion 26 feet. There are a few caverns, and one which apparently went in for some distance, but the swell was enough to cause a great and constant inrush and outflow, so that a perfectly calm smooth day would be necessary to enter it in a boat. In two places were small beaches of the same broken coral as that met with at Flying Fish Cove and the north-west beach, but they did not appear to offer the same facility for landing as the latter, though doubtless had it been necessary a landing could have been effected at either. For the most part of the way deep water extended close up to the base of the cliff, but in one place a broad plateau of nearly level coral rock extended for some yards from the cliff. I noticed

one or two spots in the shore-cliff where perhaps it might have been climbed, but, with these exceptions, its overhanging nature would quite prevent anything of the kind. Numerous frigate birds, gannets, and boobies flew about the boat, sometimes within striking distance. The trees on the slope of the island are dotted about with the gannets, who frequent them in great numbers.

"About an hour after leaving the ship we landed on the north-west beach in the skiff, the steamboat being anchored in 10 fathoms, just clear of the off-lying rocky ledge. A note from Marescaux, which I received on landing, told me that on the previous afternoon, he, Monro, and their party had started inland from the coast, and after going a short distance they were brought up by a cliff; that after casting about they finally found a way up it, and having got up to an elevation of some 800 feet, had returned to the camp, starting again this morning, hoping to reach the summit.

"My cockswain and I followed in their track, which was easily done, from the trees and undergrowth having been well blazed. I was very agreeably surprised at finding that, although the travelling was exceedingly rough, the undergrowth was not so very dense, and that no very heavy cutting was necessary, it being confined to young saplings, the leaves of the young screw pine, long trailing creepers, and the like.

"The ground between the beach and the first inland cliff was composed of hard and sharp fixed masses of coral limestone, worn into holes, on the surface, with very hard and sharp edges, so that the leather and soles of our boots were cut to pieces. Here and there high pinnacles of rock stood up, amid the lower rock, loose soil being distributed in the interstices, in which latter grew the jungle, a dead tree or two lay across the track, and various creepers extended from tree to tree, causing delay in getting on.

"In a short time we came to the base of the cliff before mentioned, which was found to be 120 feet above the sea-level. In the place we struck it, it was perpendicular, almost entirely bare of any vegetation, and would have proved a barrier to further progress. Following the blaze on the undergrowth, we now turned to the eastward, close along the base of the cliff, for a distance of some 200 or 300 yards, until we came to a place where some portions of the cliff had fallen partially away.

"A steep clamber up the rock, which was perfectly firm, or nearly all of it so, brought us above this inland cliff No. 1. The actual height of the clamber was 85 feet (on either side this cliff was much higher) and when above it, we were 205 feet above the sea. We now passed over ground of a similar nature as below the cliff, the slope being moderate, and perhaps rather more soil among the rocky patches, which latter, however, were thickly distributed about.

"It is not easy to estimate distance travelled under such circumstances, but I do not think we had gone more than half-a-mile when we came to

a second sharp rise in the coral, almost similar to the first, but not so steep. The bottom of this cliff No. 2 is 455 feet above the sea.

"Beyond this the ground assumed again its moderate slope, the same coral rock cropping up, though not in such large quantities, until a third rugged and steep bit of coral rock was met with. The surface of this was if anything more broken, confused, and rugged than in either of the other two inland cliffs, and necessitated care in crossing it.

"After getting above this, at 550 feet above the sea, we were on a moderate incline again, the coral rock above the ground ceased, the soil was much thicker and apparently richer, consisting of leaf mould with loose and small broken fragments of coral limestone met with now and then.

"The travelling now became very good indeed, and the large trees were more abundant. One which had fallen, and possibly not so very long since, I measured, and found to be 106 feet in length, and 76 inches in girth, and four feet above the buttress of the roots. This was, comparatively with some of those we saw standing, a small tree; it was perfectly straight, and had not the sign of a branch in the whole of this length. When I say the large trees became more abundant, I mean that large trees are met with the whole way up, but they are not so frequent, and this I think arises probably from the great difference there is in the amount and quality of the soil, after getting above the level of the third cliff. I have not much hesitation in calling them all 'cliffs,' for although they did not offer any obstacle except a clamber in each case, yet, when sounding in a ship round the island, these cliff terraces were seen in places most distinctly; and, while in the main, it appears as if the island was terraced in this manner nearly all round (the spurs running down to the various points being apparently more free from them than the bights and indentations of the land), yet it would appear that in this locality the cliffs have been more worn away and broken up.

"I could not observe any difference in the rock forming the different terraces. To quote Moseley's notes in the *Challenger* at Bermuda:— 'The rock is honeycombed by action of the rain and sea-water, and in its surface has a remarkably corroded appearance. It is eaten into cup-like hollows all over, separated from each other by extremely sharp-projecting points and edges. In some places the rock has been left by denudation, projecting in isolated pinnacles and peaks of fantastic form.' I have not quoted exactly word for word, but the form here given will convey a very tolerably accurate idea of what this coral limestone is like. When struck with a hammer the sound produced is as if hard metal had been hit, and a good heavy blow is required to dislodge a piece from *in situ*.

"An easy ascent of about a quarter of an hour brought us within hailing distance of the two lieutenants and their party, who, after cutting the way, by which we had profited, had reached a spot hereafter

known as 'the 'Luncheon Tree,' whence the ground began to slope downward, and we thus hoped we had reached the summit of the island; but although the undergrowth was by no means very thick, we were surrounded on all sides by trees, and the foliage was so thick that no sign of the sky was visible except immediately overhead, where it was seen in all its blueness, with small vapoury masses of cumulus driven across it by the south-east wind which was blowing. To make quite certain we had reached the summit, it would be necessary to explore around, and that was left for another day.

"Before going down we walked for a short distance in a southerly direction, and came in a small area of loose small stones; these were examined, and some have been brought down as specimens. These were very much weatherworn, and some of them more or less rounded as if by the action of water. The soil under these stones was quite damp, which very possibly may be from previous rains or dew, as the sun does not penetrate through the leafy canopy above the area. It is curious how this little patch of stones comes here, all round about within a limited compass. There are certainly loose stones lying here and there, and sometimes they are plentiful; but in this case there is an area absolutely covered with them, none large, and all very dark in colour." These stones turn out on examination to be volcanic.

On a subsequent visit Captain Aldrich thus describes the discovery of the summit, starting from the Luncheon Tree:—

"The direction was nearly due south, and we first went down a gradual slope over ground in which there were few stones, undergrowth not very thick, and travelling good.

"After descending perhaps 50 feet, we commenced rising again on a gentle slope, the ground being more or less covered with boulders and stones of coral limestone, of a dark greenish hue, from damp and exposure. These made the travelling not nearly so good, but it did not last long before the ascent was much more rapid, the ground amid the trees being covered with large fern, here and there a large hart's-tongue, the fronds of which were often some six feet in length. This soon led us to a steep clamber, on to a pinnacle of weather-worn coral limestone, the highest part of which formed a ridge not more than 12 inches in width and about four feet long. The rock was standing up, having nothing on top but a little soil in the small holes and crevices, but all round it and below was a tangled mass of undergrowth, dead wood, ferns, and with large trees round about. The pinnacle was not the only rock, for within a few feet of it, and not more than eight feet below it, lay another mass of coral rock, much pitted and worn on the top, having at its lower part, which was facing the east, the appearance of having been worn away by the action of the waves—being very similar to the under portion of the shore cliffs which now surround the island. I give a photograph of this rock which Lieutenant Monro took at my request. This rock

struck me as being very peculiar, and was the only one of a similar nature which was seen. It appears as if at one time it formed the lower portion of a cliff washed by the sea—the back portions of which have all been worn away—the hollowed part having from its form been protected. It will be seen from the photograph what is the tangled state of the vegetation around it. The cavity is from one to two feet in depth. This, the highest point of the island, is 1190 feet above the sea.

“From the pinnacle we observed, through the trees, what appeared to be another, quite close to, and on the same level. We made our way to this, over what proved to be not more than 150 yards on exceedingly rough ground, the rock and undergrowth being mixed in a most confused state. From here we could see the sky here and there through the foliage, on a level with and below us, all round except in an easterly direction, this small arc being obscured by the increased density of the foliage. The sea on the western coast was seen in places, and the tangent of the south-western point of the island was also visible.”

Captain Aldrich further gives some details of a night's camp on the ridge. “It was dusk when we reached a spot on the ridge, and camped for the night. About 11 p.m. a breeze sprang up, and it was quite cold enough to enable us to enjoy a good blazing fire, which we had no difficulty in making from the large amount of dry wood round about.

“When we first arrived the huge crabs came about us in large numbers; in fact, they swarm all over the island, so far as we saw it, and when halted for a few minutes one hears them approaching in all quarters. These are of a bluish-yellow colour, with large claws and outstaring eyes, and most offensive to look at.” You will remember that Dampier and his men welcomed these crustacea as good sweet meat, from which you will probably justly infer that sailors nowadays are better fed, and consequently more particular. “At dark these creatures apparently ceased roaming about, for we neither saw nor heard any of them. We were not without company, however, for the rats came out and were as abundant as the crabs. I shot a couple, and two were killed with one blow from a stick, and very many more might have been got had we thought it worth while procuring them.

“We brought hammocks with us, and slung them under the trees; mine was between two and three feet from the ground, and three rats I know came over me as I lay in it, how many more when I was asleep I have no means of telling. We could well have used a blanket, but they would have added too much to our weights for carriage.

“There was a wonderful paucity of insect life; I had hoped by watching to have secured some by means of a light which I had placed on a fallen tree, but a close study for two hours only produced one small moth. It was very still in the bush; beyond the rustling of the trees and the expressions of certain differences of opinion among the rats there was no sound.

"The largest trees met with are those which grow with large buttresses which support the stem. The latter itself is not so large, and may be perhaps four to five feet in diameter. These trees are generally devoid of branches, except near the top, where they have a somewhat scrubby appearance, and are much overgrown with creepers, which latter would seem to take the life out of the upper part of the tree. In many cases there are numerous stems of these creepers reaching down from the highest parts, ranging from an inch to eight or nine inches in circumference. I took the following measurements about one of the largest trees I saw, which was about 800 feet above sea-level. The photograph is one taken by Lieutenant Monro. Outside the buttress on the ground, 75 feet; outside the buttress 2 feet above ground, 56·2 feet. From outer edge of the biggest buttress to the trunk, 13·8 feet; from the top of the buttress to the ground, 15·6 feet. There are large trees without buttresses in the island; Lieutenant Baker measured one in the neighbourhood of Flying Fish Cove which was perfectly straight, and at four feet from the ground was 34 feet in circumference."

No coco-nuts nor limes were seen, nor any of the wild hogs reported by the *Pigot*. Captain Aldrich brought back specimens of rock from various parts, and also caused a hole to be dug on the ridge, whence from a depth of nearly six feet some earth and stones were taken. These stones are volcanic, and the earth is also volcanic. The limestone rocks, to judge from the hand specimens, are of various natures: hard crystalline limestones with no trace of fossils, and fossiliferous limestones with foraminifera, the size of these shells varying in different localities.

Ascents were also made in the neighbourhood of Flying Fish Cove, which resulted in proving that the character of the island was there also precisely similar; coral limestone everywhere, and the same cliffs at intervals. Here also, however, some fragments of basaltic rock were found about 200 feet above the sea.

Botanical and zoological collections were made during this exploration by Mr. Lister.

Now what inference are we to draw from this description? We have a high island, on the surface of which wherever examined we find limestone, bearing in most places the appearance of coral origin, though in some specimens the shells of the foraminifera abound, and in none of them have direct evidence of coral structure been detected. It must be remembered, however, that coral limestone becomes so altered by the deposition of lime by infiltration, that a large surface of it may be searched before a piece retaining its coralline structure is found, and that the specimens sent home are very small.

From the description of Captain Aldrich, who is well acquainted with coral formations, it may be taken for granted that the majority of this rock is of coral origin. The rock forming the summit of this

structureless character. In two spots, and at the bottom of a hole in the summit of the ridge, we have volcanic rock.

The island is very steep on all sides, great depths being found close to the cliffs, while on all sides, at a short distance, soundings over three-miles in depth were obtained.

It appears, then, most probable that Christmas Island is founded on a volcanic mound which rose from the bottom to a certain distance from the surface of the sea; that foraminifera shells dying on the surface were rained upon it in sufficient number to form a stratum, since solidified into limestone rock; that as the mound neared the surface, corals built upon it, and it is possible from the sketch of the island, and from Captain Aldrich's description of the slope of the ridge inwards, that it first assumed an atoll form. This, however, is a mere inference from probabilities.

The island was next gradually upheaved, the coral growing outwards on the gentle slope until a period of immobility ensued long enough to permit the waves to erode the upper cliff. Another short period of upheaval, and one of stationary character ensued, when the second cliff was worn away. A third interval of upheaval, probably longer than the others, and then a longer stand, when the lowest and highest inland cliff was formed. Finally, another lift was given, and the stationary period now in existence completed the process.

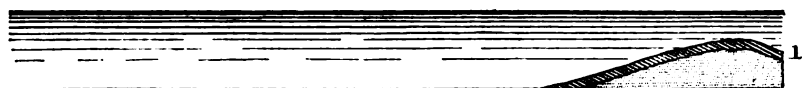
The volcanic stones found in various places on the higher parts of the island point to a thinning of the limestone covering in those places. Denudation has worn away the limestone, and the volcanic core is consequently exposed.

The diagrams show my ideas as to the manner in which the coral casing has been gradually formed, as the island has been slowly raised from the deep. They are ideal sections of the part ascended by Captain Aldrich, which is shown in its present condition in No. 8, while No. 1 represents the volcanic mound still deep below the surface, but covered with the relics of marine calcareous organisms.

Man has never lived on Christmas Island, nor would it be a pleasant residence, as, apart from the fact that there is no water—the rain sinking into the limestone rock—the extreme discomfort of locomotion, and the absence of any harbour whence the produce that might possibly be raised could be conveniently shipped, will deter any settlers from seeking a home there until other more favourable spots are occupied.

There is no other instance with which I am acquainted of an island of this height retaining its coral covering so intact. Coral reefs have been found at heights of 1000 feet in Cuba, in the Fiji Islands, and other places; but in all cases they are mere fragments, and the intervening spaces show no signs of coral.

Further and closer investigation may record more direct evidence of its structure, and of the successive steps which have resulted in its



1



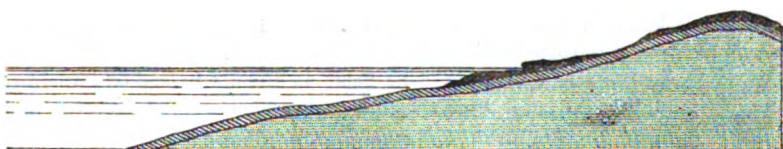
2



3



4



5



6



7



8

 *Coral Limestone*
 *Foraminiferous Limestone*
 *Volcanic Formation*

present condition; but I have thought that our present knowledge of Christmas Island is sufficient to make this short notice interesting to the Society.

The paper was illustrated by a series of eighteen views shown by the dioptric lantern.

After the paper,

Mr. J. J. LISTER said there were two kinds of bats in Christmas Island. One was a fruit-eating bat, a specimen of which was brought home by Captain Maclear. Rats swarmed all about the island. They were of two kinds, one of which had been named after Captain Maclear, and the other appeared to be an undescribed species. There was also a shrewmouse, which completed the list of the mammalia. With respect to the birds, a thrush and a fruit-eating pigeon had previously been brought home by the *Flying Fish*. All the birds on the island were exceedingly tame, and could be approached with the utmost ease. Other birds were a goshawk, an owl of the genus *Ninox*, and a *Zosterops*, a kind allied to the Australian honey-eaters. A swift was also common, as well as a pigeon which had a beautiful bronze-green back, and brown head, neck, and breast. Its colours exactly resembled the ground on which it found its food. The water birds were the common English sandpiper and a ring-plover. The sea birds were frigate-birds, boobies, gannets, and boatswain birds. Five kinds of snail shells were found, four species of butterflies, and eighteen of coleopterous insects.

Mr. H. O. FORBES said that in 1878 he made an attempt to land on Christmas Island, but owing to the wind it was impossible to do so. He found, however, that Mr. Ross had landed and removed a large amount of the hard wood which was called teak. Christmas Island was in an area not of depression but of elevation, which was in accordance with certain observations he had made in Keeling Island, where the coral was rising and not sinking. The distribution of the land animals, birds, and bats was exceedingly interesting, as they were similar, not to those in Java, but to those in the farther off Molucca Islands.

On the New Lake between Kôm and Teherân.

By H.M. THE SHÂH OF PERSIA.

(From the Teherân gazette 'Irân,' Nos. 655 and 656, 10th and 19th May, 1888 :
translated and annotated by General A. HOUTUM-SCHINDLER.)

Map, p. 676.

THE lake which has appeared between Teherân and Kôm is the lake of Sâvah, of which mention is made in history, and which dried up about 1357 years ago, on the day the prophet—may the blessings of God be upon him and his posterity!—was born. It reappeared about six years ago.*

* De Sacy fixed the date of the prophet Muhammed's birth as the 20th April, A.D. 571, but added, "En vain chercherait-on à déterminer l'époque de la naissance de Mahomet d'une manière qui ne laissât subsister aucune incertitude." Sprenger follows him, but considers the date only as a conventional one, generally accepted during the first half of the first century of the Hijrah. Muir accepts, as an approximation, the date

The lake was called Lake of Sâvah because it joined the district of Sâvah, and was in part formed by the waters of the river coming from Sâvah.*

fixed by Caussin de Perceval, viz. the 20th of August, A.D. 570, and remarks, "We know accurately the date of Mahomet's death, but we cannot calculate backwards with certainty even the year of his birth, because his life is variously stated as extending from sixty-three to sixty-five years, and besides this, there is a doubt whether the year meant is a lunar or a luni-solar year. It is scarcely possible to believe that the date could, under ordinary circumstances in Meccan society as then constituted, have been remembered with perfect accuracy." Von Hammer fixed on A.D. 569. There is a tradition by al-Hâfiz, on the authority of Makhzûm, that during the night in which the prophet was born the hall of the Khosroes (at Ktesiphon) trembled, and fourteen of its turrets fell; the fire of the Magi, which had burned uninterruptedly for a thousand years, was extinguished; the Lake of Sâvah disappeared; and the high priest of Persia dreamt that camels, followed by Arab horses, crossed the Tigris, and overran Persia. The next morning the King of Persia (Khosro I, Anûshirvân) was very much frightened, and asked the Marzabâns (Lords of the Marches, Governors of Provinces) for advice. They decided to ask al-N'omân ibn al Mundhir, the governor of Hîrah, to send them a sage who could interpret the dream and explain the portends. Al-N'omân sent old 'Abd al Masîh (he was more than 300 years of age), a great-grandson of Hayyân ibn Bo-Kâileh, and he sent for his uncle Sâthî, &c. &c.

It would be quite impossible to prove that the lake did or did not disappear at the time mentioned in the tradition, but the legend, as it is, proves that at some time before the advent of Islâm, a part of inner Persia was covered by water. There were probably a number of distinct lakes, now patches of salt desert, which are spoken of in the popular legends of Persia as a vast sea extending from Kâzvin on the north to Kermân and Mekrân in the south, from Sâvah on the west to the Sîstân depression in the east. These legends, which I have heard at many places on the confines of the desert, not only speak of a great sea, but also mention ships, islands, ports, and lighthouses. Gobineau ('Histoire des Perses,' Paris, 1869) repeats the legend: "Au sud de Rhages et de Herat les frontières de cet empire étaient tracées par les rivages d'une vaste mer intérieure. Le lac Hamoun à l'orient et le désert de Khaver (Kevîr) n'étaient que des golfes de cette masse d'eaux. Kerman faisait face au midi, Yezd était une des îles principales. A Savah il y a une tour, haute, isolée et extrêmement menue. Les gens du pays assurent que c'était un phare destiné à guider les vaisseaux qui naviguaient sur la mer de Khaver. A Meibud il y a des vestiges de constructions anciennes. On prétend qu'il y avait là un port considérable sur une mer étendue, et que c'était l'entrepôt des marchandises transportées par cette mer et qu'on y acquittait les droits de douane." The old tower on the hills north-east of Kâzvin is popularly called a lighthouse, and the village Bârchîn, north of Yezd and not far from Maibud, is called an old sea-port and custom-house.

* The town Sâvah lies about 75 miles south-west of Teherân and 42 miles north-west of Kôm, a little to the north of a river, which is variously called Mazdâkân Châi (because its principal tributary passes Mazdâkân), Rezâ Châi, and Rûd i Sâvah, and which rises in the hills between Teherân and Hamadân, and flows into the Kâra Châi (formerly called Gâymâsa-rûd) south-east of Sâvah. It has not often been visited by Europeans, and those who have done so have not said much about it. Keith Abbott, who was there in 1849, has given most details (in the 'Journal' of the R.G.S., vol. xxv.). The town has at present about 6000 inhabitants. The celebrated *band*, or dam, which served to store up the waters of the river for the irrigation of the district during summer, is in a ruinous state. The legend which Marco Polo relates, that the three Magi who went to see Christ had come from and were buried at Sâvah, is at present ignored. Keith Abbott thought Sâvah the most ruinous town he had ever visited, and Olearius, in 1637, also speaks of its ruins. The following is from the 'Nuzhet al Kulûb,' written by Hamdullah Mustôfi, A.D. 1340: "Sâvah.—The ground on which this city now stands was formerly covered

The rivers which now flow into the lake are the following:—The Sâvah river, the Rûdkhâneh i Shûr (Salt-river), which rises in the Zerend district, the Kerej river, which enters the lake below Dair, and the Kôm river which, after passing Kôm-rûd, enters the lake below the village Kâj. Kôm-rûd is an important village of Kôm and belongs to the Crown.*

by a lake, which disappeared underground during the night the prophet was born. This disappearance was one of the signs portending the prophet's coming. The founder of the city is unknown, and at the present time the place is not so flourishing as it was. Khojah Zahir ed dîn 'Alî ibn Khojah Malik Sheref ed dîn Sâvajî (i.e. of Sâvah) surrounded it with a rampart 8200 yards in extent, and fortified it with towers and brick bastions. His son, Khojah Shems ed dîn, enclosed the village Rûdâbân, which was contiguous to the town, within a rampart of 4000 yards. The climate of Sâvah is rather warm, but salubrious; its water supply comes from the Mazdâkân river and from canals. The people also fill pits with ice in winter for consumption in summer. Sâvah produces good fruit, as, for instance, grapes, apples, quinces, and figs. Its inhabitants are very pious Shâfa'i Sunnis, but the inhabitants of the villages are Shf'ahs. The district is divided in four parishes, and contains 125 villages. The first parish is Sâvah, with 46 villages. . . . (Here the text of my three MSS. is defective.) . . . The town pays a yearly revenue to the State of 2½ tûmâns (25,000 dinârs, about 15,500*l.*); the villages of the district pay 4½ tûmâns (45,000 dinârs, about 28,000*l.*). The bread of Sâvah is not good. Its barley and straw do not agree with animals, hence the saying 'Straw of Kôm is better than barley of Sâvah.' Near the town is the tomb of Shaikh 'Othmân Sâvajî and that of Syed Abû Ishâq ibn Mûsâ al Kâ'em, and to the west, towards Kharâkân, and four farsakhs from Sâvah, is the tomb of Samuel the prophet." Chardin mentions Samuel's tomb, too, but he is quoting the 'Nuzhet al Kulûb'; he wrongly calls the river of Kôm Djoubâdgân, a name which he also got from the Nuzhet, reading *z* for *r*, a mistake easily made when reading Persian MSS. The correct name is Jerbâdegân (see next note). Eastwick ('A Diplomat's Three Years' Residence in Persia') copies Chardin, and also speaks of Djoubâdgân. The Nuzhet does not mention the famous library of Sâvah, which, according to Yakût (Mo'jem al beldân), was destroyed by the Mongols A.D. 1220. At present (1888) Sâvah and its district pay a yearly revenue of about 2600*l.* to the State, less than 6 per cent. of what they paid in the fourteenth century. Regarding the Ab i Mazdâkân, the Nuzhet says, "This river rises in the hills of Kharâkân, Mazdâkân, and Hamadân, and passes Mazdâkân and Sâvah; in the time of ignorance (i.e. before Islâm) it formed the lake of Sâvah, which, through a miracle of the prophet, became dry. The town of Sâvah was built where the lake once was. The river has been diverted from its course, and runs into the desert. Its length is 25 farsakhs."

* The Sâvah river is, as I have shown in the preceding note, the Mazdâkân Châi; the river here meant is the Kâra Châi, which receives the Sâvah river south-east of Sâvah. The Kâra Châi was formerly called Gâvmâsâ-rûd, and is formed by the Rûd i Dô-âb or Zarîn-rûd, rising in the Râstband or Râsmend hills, by a number of streams from the Hamadân district, by the Mazdâkân river, and many other smaller streams. The Nuzhet al Kulûb says, "The Gâvmâsâ-rûd has some of its sources in Mount Elvend of Hamadân, others in the hills of Asadâbâd and Mâsâ-rûd and in the Farivâr district of Hamadân, others in the Râsmend mountain, and others in the hills near Kerj and the Kaitû plateau (the present Kezzâz), and passes the Hamadân and Sâvah districts. Near Sâvah and Avah, behind a dam which Khojah Shems ed dîn Muhammed, Shâh i divân (finance minister), constructed, it forms a lake, and the canals leading from it are crossed by seventy bridges between Sâvah and Avah, all constructed by Atabeg Shifgrî, and the river, lower down, loses itself in the desert. By means of the dam, the districts of Sâvah and Avah are irrigated during the summer, and the river is for Sâvah what the Zendebrûd is for Isfahân. Its length is 40 farsakhs."

From observations which we have made we conclude that this lake has been formed by waters which bubbled up in the Kavîr* like fountains from underground, for the rivers which flow into it have not changed their direction and did not form a lake. A camel-driver of the

The Kôm river joins the Kâra Châi at Pul i dellâk (the Barber's bridge), 15 miles from Kôm. It is also called the Gulpâigân river, because it rises in the hills near that town, and near Khunsâr; it receives a tributary from near Sulţânâbâd. The Nuzhet al Kulûb calls it Kôm-rûd and Ab i Jerbâdegân (arabised form of Gulpâigân), and says its length is 35 farsakhs.

The Rudkhâneh i Shûr rises near Saltânfeh, and is the same as the Abhar-rûd. In its upper course, where it passes Abhar and irrigates the plain south of Kâzvin, its waters are sweet; south-west of Teherân, where it is known as the Salt-river, it flows over gypseous formations containing salt, which renders its waters undrinkable. The waters from the plain of Pîk (in the Zerend district) join it a little above the bridge on the Teherân-Kôm road. It then runs east to the desert.

The Kerej river rises north of Teherân near Shahristânek, behind the first chain of the Elburz, enters the plain about 25 miles west of Teherân, at the village Kerej (the Karah of the old authors), and flows in a south-easterly direction towards the desert.

Dair (placed correctly on St. John's map 19 miles east of Hawz i Sulţân) is the Dair ul jiss (the plaster-inn) of Muḩaddeef and Istakhri, the Dair i Girdshîr of Yaḩtut {Does Girdshîr mean plaster? or has the word any connection with the name Ardashîr? Yaḩtut ascribes the foundation of the place to the Sassanian Ardashîr}, the Dair i gachîn (same meaning as Dair ul jiss) of the old Persian authors, in the desert, half-way between Kôm and Rai. It was a large building with high walls and iron gates on the then high road between Rai and Iṣfahân. It had a spring of brackish water, and close to it in the rock there were two round cisterns for rain-water. The old building was repaired and renovated some fifteen years ago at the expense of the late Mustôff al Mamâlik, Mirzâ Yûsuf. Only one cistern is there now, and a few families reside there in winter and early spring, before the freshes, when camels graze in the neighbourhood.

Kâj (six miles south-east of Şadrâbâd, and 20 miles from Hawz i Sulţân; De Bode calls it Koj) is also mentioned by the old geographers. It is situated in the desert, one day's march from Kôm. Muḩaddeef remarks that Kâj was formerly a village, but that all its inhabitants had been driven away by robbers. All that there is now at Kâj are the ruins of an immense stone caravanserai, some poor fields cultivated by a few families living in miserable huts, and a water-mill.

Kôm-rûd lies 11 miles north-east of Kôm, on the right bank of the Kôm river. De Bode relates some unfounded reports he had heard regarding its inhabitants. ('Travels in Luristan and Arabistan,' London, 1845, vol. i. p. 21.)

* Kavîr is a salt-swamp or salt-desert. Some Persian dictionaries add that Kavîr is synonymous with Sarâb, "a salt plain which at a distance looks like water," others, more correctly, explain sarâb as a kind of mirage or looming, which looks like a sea at a distance. Some authors, wrongly I think, have derived the word Kavîr from the Persian gav, gâv, a depression, a hollow (cf. gâv-mâsâ, gâv-khâneh, &c.), synonymous with gôd or gôdâl, but hollows may be fertile, while a Kavîr is *always* a salt-desert totally devoid of vegetation. Another Persian word from which authors derive Kavîr is gûr, in some dialects also kûr, a grave, a hollow, a pool, a river-bed, a hole, also a level plain; from the latter we have gûr-khar, the ass of the plain (*Equus asinus onager*). This animal is also, shortly, called gûr, and this has given rise to the punning verse about the Sassanian King Bahrâm, surnamed Gûr, who was a famous hunter of the wild ass, and died through falling into a hole: "Bahrâm used to catch the gûr (ass), but at last the gûr (hole) caught him." The hole or pool into which Bahrâm fell was in the plain near Kûshk i Zard, between Iṣfahân and Shîrâz. In 1810 a young man of the 17th Dragoons, one of the detachment accompanying Sir John Malcolm, was drowned

Arab nomads of the Kelekû tribe, which has its camping ground on the shores of the lake, told us that he had seen with his own eyes how six years ago a great quantity of water bubbled up in the middle of the Kavir, and, gradually increasing, finally submerged the places where it had appeared.*

In short, there is the lake, and we will now relate what we have seen and will also in a map show the figure and position of the lake.

The lake is bounded on the south by some low mountains and hills, known as Gul-tepeh, by Manzarieh, by the Sâvah river, the Pul i dellâk and the Kôm district.†

On the north it is bounded by the Kûh i Mareh, the Rûdkhâneh i Shûr, and the Teherân district.‡

On the east are Dair, Kâj, and the Masileh, which is the grazing ground of the camels belonging to the crown, by the Siâh Kûh, the Davâz-dah Imâm (the twelve Imâms), and the great Kavir, which extends as far as Sistân.§

in the same hole. (Sir John Malcolm's 'History of Persia,' chap. v.) The old geographers use for the desert the word Mughâreh, which, like gûr, means a hollow or depression. The origin of the word Kavir is perhaps the Arabic Kafr, Kafreh (pl. Kufûr), which is still the ordinary appellation for the deserts of Arabia and Africa. The word is seldom met with in older authors; I think Ferdûsî uses it only once, and it may be a modern importation. In the south of Persia (Kermân) one sometimes hears the Kavirs called Kefeh, which word is perhaps derived from kef, meaning froth, foam.

* Others ascribe the formation of the lake to another cause. In 1883 a part of the dyke on the left bank of the Kara Châi below Pul i dellâk and near Kâj gave way during a freshet, and some of the water of the river, turning off north through the gap in the dyke, made its way into the depression between Hawz i Sultân and Pul i dellâk. The lowest part of this depression lies west of the old high-road, and up to about June 1883 travellers noticed a shallow stream, a few yards in width, flowing over the road at right angles to it, and in a direction east-west, into the lowest part of the depression. In previous years this depression was turned into a swamp by the rain water which flowed into it every spring from the surrounding hills, but it received no water from the river. During the floods in the spring of 1884 the gap in the dyke near Kâj became enlarged, and the lowest part of the depression became filled and formed a little lake which submerged about 100 yards of the road and caused much trouble to travellers. At that time a benevolent citizen of Teherân, hearing of the difficulties experienced by poor pilgrims going to Kôm, had the intention of repairing the dyke, but nothing was done, and in 1885 the lake assumed its present proportions, and travellers were obliged to use the new road. As the breach of the dyke happened when the new road was being constructed and as it was intended to take a toll from caravans using it, uncharitable persons said that the dyke had been wilfully damaged by the farmer of the new road in order to prevent people using the old one.

† Manzarfeh is a station on the new road from Kôm to Teherân, 18 miles from the former. Pul i dellâk is a bridge over the Kara Châi, on the old road from Kôm to Teherân, 15 miles from the former. It used to be a station for post-horses (Chapâr Khâneh) and has a caravanserai. The Kara Châi is there joined by the Kôm river.

‡ The Kûh i Mareh are the hills with the well-known "Valley of the Angel of Death" (derreh i Malek el Mawt) south of Kinârigird.

§ A Masileh is any place which is flooded by water; here, however, is meant the depression near Siâh Kûh and south of Verâmîn, overflowed in spring by the waters of

On the west are situated the districts of Sâvah and Zerend, the Kûh i Bâbâ Kârî, with the grave of an Imâmzâdeh, which is much frequented by the Arabs and other nomads inhabiting the neighbourhood, the Gök-dâgh, which joins the Zerend district, and the camping grounds of the Inânlû Shâh-seven nomads.*

the Jajrûd, and of other streams from the Elburz near Teherân. The camels graze there only in winter and early spring before the rains, and a causeway, now ruined, leads through the deepest part.

Siâhkûh is the southernmost of three small parallel chains of hills south-east of Teherân, having a direction of N.W.-S.E. The first and most northern of the three chains is the Kûh i Makraj, which is separated from the Tang i Sar-derreh (the Caspian gates) by a narrow strip of desert, and has at its western end the village Hasanâbâd, about 10 miles from the town Verâmin; its western part is also called Kûh i gachî (gypsum hill) and its eastern part Kûh i Nimek (salt hill). The next chain is the Kûh i Kolung, and between it and Kûh i Makraj are moving sands. The third chain is the Siâh Kûh, with the caravanserai 'Ain ur Rashid, one of Shâh 'Abbâs' constructions, at its western end, on the old road from Kâshân to Khâr, 64 miles from the former, and 34 miles from the latter. Its distance from Teherân is about 85 miles, and its bearing to Demâvend north $5\frac{1}{2}^{\circ}$ west (cf. Tietze, Mitth. d. k. k. geogr. Gesellsch. Wien, 1875). The Siâh Kûh mentioned by the old geographers is not this Siâh Kûh, but seems to have comprised the hills now known as the Kinarigird hills, north of Kinarigird, and the Kûh i Mareh, south of it. Istakhrî says: "When going from Rai to Dair the Siâh Kûh lies to the right, and the Kerges Kûh to the left, the former five, the latter four farsakhs from Dair." The present Siâh Kûh east of the lake is therefore Istakhrî's Kerges Kûh. The Nuzhet al Kulûbsays: "The Kerges Kûh lies in the desert on the confines of Națanz, and is joined by no other mountain; it has a circumference of ten farsakhs (some MSS. have two farsakhs) and is so high that vultures cannot reach its summit, hence its name (Kerges, old Pers. Kahrkâs, Karkâs = vulture.) In the midst of the mountain is a place covered with ooze (wafâf, a bog, marah) which from afar looks like water, and it has often happened that thirsty hunters thinking it to be water, and approaching it for the purpose of drinking, sank into it and perished." Istakhrî adds, "in the midst of this mountain is a spring called Ab i Bideh." Ibn Hawlâl says, "It is called the mountain of the vultures, because vultures have their nests on its summit," which explanation is probably better than the Nuzhet's. The descriptions hardly tally with the present Siâh Kûh which is not a high mountain, rising only 2500 to 3000 feet above the surrounding plain. The high mountain (9500 feet), with granite peaks, close to Națanz, and a few miles to the west of it, is now called Kûh i Kerges, but this mountain can be neither the Kerges Kûh of Istakhrî, for it does not lie to the left of the road between Rai and Dair, nor that of the Nuzhet, for it is not isolated, and does not lie in the desert. The Kerges Kûh of the old authors is therefore the present Siâh Kûh. It was on the high road between Mâzanderân and Isfâhan, and could be reached from the latter place either direct from Națanz, leaving Kâshân on the left, as was done by Th. Herbert in 1627, and this would explain the Nuzhet's "on the confines of Națanz," or viâ Kâshân, as was done by della Valle in 1618. Both these travellers passed Siâh Kûh, and describe the desert in its vicinity. When della Valle passed, the broad causeway through the Masleh was being constructed by order of Shâh 'Abbâs; it had many culverts and bridges, and the largest of the latter was in the middle of the causeway, and the stream flowing under it was called Ajî Ohâf, i. e. the bitter river.

Davâzdah Imâm is the most southerly village of the Verâmin district; it has a building said to contain the tombs of twelve saints, and some hills close by, a part of the Kûh i Kolung, are called Kûh i davâzdah Imâm.

* The Gök-dâgh (generally pronounced Gõi-dâgh) begins south of Pik, and striking north-west to south-east, extends to near the new Teherân-Kôm road, from which it is separated by the Kûh i Bâbâ Kârî.

No. X.—OCT. 1888.]

2 u

From Teherân to the shore of the lake is a distance of 14 farsakhs, and from Kôm to the lake is 12 farsakhs.*

The old road from Teherân to Kôm, before the formation of the lake, went through where the lake now is and came out at Pul i dellâk, a bridge which was built in olden times over the Sâvah river, and the road from the bridge to Hâwz i Sultân was four farsakhs. At present, when travellers wish to go from Hâwz i Sultân to Pul i dellâk, they must go round the lake, a distance of quite 10 farsakhs.†

The road which now leads to Kôm runs along the west of the lake at a distance of half a farsakh, or a little more, from it, and passes 'Aliâbâd, which has lately been built. The water of the lake is brackish and bitter, but it is very clear and sparkling, and its colour is blue. When a wind blows, the lake has pretty waves which form white foam on the shore. On the western side of the lake, near 'Aliâbâd and Kûshk i Nuşret, the soil is hard and gravelly, and horses and carriages can approach the water's edge, and even go into the water for a hundred paces without sinking into the ground, but not having seen the other sides of the lake we cannot tell how they are, and whether horses can approach the water's edge or not.‡

We can also not say anything precise as to whether the lake has any fish or not. We had nets thrown near the place we were at, but no fish were caught, and there was no boat with which we could explore the middle of the lake. However, as the Kôm and Sâvah rivers contain much fish, it is quite likely that the lake too has some.

The shores of the lake are flat and level, and at the present season, the beginning of spring (April), the ground all around is covered with red tulips, white and yellow flowers, sweet-smelling herbs, and many bushes. The whole plain is a grazing ground of the camels belonging to the crown, and every spring about 10,000 she-camels are grazing there. With the hot weather the animals are removed to the cooler districts of Sâvah and Kharakân.

At this time, when most of the camels had brought forth their young, the greenness of the plain, the clearness of the air, the lake, and the reflection of the sun on its waters, the vastness of the plain, the many camels and their young, the camel-men and their children who were all

* That is from Teherân and Kôm to a point on the western shore near 'Aliâbâd.

† Hâwz i Sultân is a station on the old road from Teherân to Kôm, 57 miles from the former. From it to Pul i dellâk along the old road was a distance of 24 miles, rather more than six farsakhs, and between it and that station was a Kavrî, very difficult of passage after rains, and now submerged.

‡ 'Aliâbâd lies 40 miles from Kôm on the new road thence to Teherân. Some new buildings have lately been constructed there, but there is no doubt of the place being several centuries old. It has a fine old robât, a building of solid masonry, now renovated, and in one of its towers there were lately found some coins of the Mongol kings of Persia of the 14th century.

Kûshk i Nuşret is a station on the new road from Kôm to Teherân, 35 miles from the former.

busy tending the camels, the black tents of the nomads, the many flocks of sheep which were grazing in the plain, were wonderful to see. The black tents of the Arab Kelekû nomads, who are in charge of the camels, were pitched all around the lake, and much increased the beauty of the view.

We were told that millions of water-fowl frequented the lake in autumn ; at the time of our visit there were not many. We particularly noticed a bird, somewhat larger than a stork, with thin and very long legs ; when these birds rested they appeared to be white, but when on wing they looked red, for the feathers of their breasts and under their wings were red.* Of these birds hundreds at a time would suddenly take wing and fly away in regular lines, looking like a regiment of well-drilled soldiers, and would utter sounds which reached the ear like beautiful music. It is very difficult to shoot these birds, for they are very wild and keep far away from the shore, and as soon as the sportsman approaches they take wing.

The birds which are now seen on the lake are of the same kinds as those which come in autumn and winter. There were the parilâ, a black water-bird ; the pâshil-bâsh, a duck with a green head ; geese, herons of different kinds, and a kind of white king-fisher with a body the size of a pigeon's. In the plain we noticed gazelles, bustards, black-bellied and pin-tailed sand-grouse, and many others.†

The plain which extends from Kûshk i Nuşret to Manzarîeh is very pleasant ; it has no rat-holes, and is covered with pretty pebbles and red and white stones.

The figure of the lake may be compared to that of a pair of spectacles ; there are two lakes joined by a narrow channel, which is about half a farsakh in width, or a little less.

If any one start from a fixed point and go round the lake without stopping anywhere, it will take him thirty hours to get back to the place he started from ; it may therefore be assumed that the circumference of the lake measures about 30 farsakhs. This is, of course, only an

* These birds were flamingoes (*Phœnicopterus roseus*). They visit the Persian plateau in considerable numbers. St. John saw some on the Shîrâz plain in May ('Eastern Persia,' Blanford, vol. ii. p. 300), Dr. Moritz Wagner on the shores of the Urûmiâ lake in August ('Reise nach Persien,' vol. ii. p. 111), and I saw some near Isfahân in March, and near Kermân in April. They are also found on the shores of the Caspian (Dr. J. Radde, 'Ornitologicheskaya Fauna Kavkaza,' Tiflis, 1884, p. 349) and on those of the Persian Gulf (Blanford l.c.) The Persians call them "Kâz i Surkh," i. e. red geese.

† Parilâ is a Mâzanderânî word for a kind of blackish coot with a red bill ; in Gilan it is called changal and changar. Pâshil-bâsh is a misprint for yashil-bâsh, meaning in Turkish "the green head," and is the male of the common mallard (*Anas boschas*). The bustard of this region is the *Otis M'Quenii* or *Otis houbara*. The black-bellied sand-grouse is the Persian Bâkerkara or Sîneh sîyah, i. e. black-breast, the *Pterocles arenarius*. The pin-tailed sand-grouse is the *Pterocles alchata*, in Turkish Kîl kûîrûş, meaning "pointed tail."

approximation, but our approximation is very near the truth, perhaps hardly two or three farsakhs out.

Going toward Kom from Manzarieh one can plainly see that the whole five farsakhs of road one passes over from Manzarieh to the fields one farsakh from Kom were formerly covered by a lake. This part of the country was known in olden times as "Châl i deryâ" (the bed of the sea), and is so called now. Several sea-shells were picked up there, and probably in future ages this district will once again become covered by a lake, as it formerly was.* One farsakh from Manzarieh the road to Kom passes the Sâvah river, which flows from west to east, bends to the north below Pul i dellâk, and then flows into the lake we have described. Here where the road passes the river a noble bridge has been built at the expense of Government. The Amin i Sultân has had it constructed most solidly, and it may count as one of the great constructions.†

The depth of the lake has not been ascertained, because boats necessary for soundings were not handy. We ordered a man to undress and go into the water as far as he could, and 200 paces from the shore the water reached his neck and he was obliged to swim. The depth of the lake may be estimated at not more than ten zar (33 feet); later on the depth will be correctly measured.

From the shores of the lake, Mount Demâvend is visible far away in the distance, looking like a loaf of sugar, and the Elburz too can be seen. These snow-covered mountains presented a magnificent view, such as we have seldom seen.‡

* After the spring rains one often finds river mussels (*Unio litoralis*). I have seen some close to Kom.

† This bridge was finished in 1886; at the end of March 1887 it subsided during a flood after some days rain in the hills. It has now been reconstructed, more solidly, it is hoped, than before.

‡ I have seen Demâvend from the hills near Națanz, 175 miles in a straight line from Demâvend (altitude of hills near Națanz over 7000 feet, Demâvend 19,400 feet).

NOTE TO MAP.—The map is only a rough sketch, yet the distances are fairly accurate. The bearings are not quite right, and Dair and Kaj should, I think, be placed further south. The circumference of the lake is given in the text as 80 farsakhs, on the map it is much less. A scale may be constructed from the distance between 'Alîâbâd and Kûshk i Nușret, which is about 5 miles. I may add that we expect some further details regarding the new lake, as Major Welis, R.E., has lately made a survey of the country between Teherân and Kom.

The Bantu Borderland in Western Africa.

By H. H. JOHNSTON, H.M. Vice-Consul, Cameroons.

Map, p. 676.

THE region stretching from Old Calabar and the Cross river to the base of the Cameroons Mountains is very interesting from an ethnological point of view, because it is, on the West Coast of Africa, the borderland of the Bantu. South of the river Ndiani, which flows into the estuary of the Rio del Rey, the population, with the exception of a few scattered colonies of foreign Calabar traders, belongs in race and language to the great Bantu family which stretches uninterruptedly eastwards and southwards from the Cameroons to Zanzibar and to Natal. North of the Ndiani river we enter that interesting belt extending across the continent of Africa southward of the Sahara Desert from Senegambia to Abyssinia, which may be conveniently known by its Arab name—the Sudan.

Here, in contrast to the homogeneity of race and language which prevails in the southern half of Africa, we find an amazing variety of negro and negroid races, and an uncounted number of dissimilar tongues. The inhabitants of the district of Old Calabar chiefly belong to the Efik tribe, and their language, which bears the same name, is a form of speech distantly—but decidedly—related to the Ibo group which prevails in the upper part of the Niger delta and stretches across to the western bank of the Cross river.

The Efik people, now the ruling race along the lower courses of the Cross and Old Calabar rivers, appear to have emigrated over a hundred years ago from a district on the Cross river adjoining the Ibo country. Pushing their way towards the sea, they dispossessed and partially absorbed or drove away the former inhabitants of the district now known as “Old Calabar” (Calabar is a word of obscure origin, first used by the Portuguese), these inhabitants belonging to the “Akwa” or “Abakpa” tribe, and being connected in race and language with the people inhabiting the district on the Upper Cross river.

The Efik people, or their congeners speaking a nearly identical language, have penetrated to the Kwō-Ibo and Opobo rivers on the west, while little trading colonies, started from Old Calabar, are dotted here and there among the Bantu tribes, beyond the Rio del Rey. Between Old Calabar and the Akpayafé river there still linger remnants of the older possessors of the land, such as the Akwa or Abakpa people. These helot races have imitated their Efik rulers in many things, but their languages bear much less affinity with the Efik dialects than with the Upper Cross river tongues.

The farther one travels in a south-easterly direction from Old Calabar the more sparsely the country is inhabited, until the land on the southern

side of the Mboma-Njinga river begins to rise into hills and mountains, and then one finds oneself approaching the populous country of the Bakundu people. These, in common with the closely allied Barondo (who inhabit the coast and advance in little isolated settlements into the Calabar district), are the first tribes speaking purely Bantu languages which are to be met with in journeying from Old Calabar towards the Cameroons. The Bakundu speech, which is also common to the Barondo, is almost identical with the Duala of the Cameroons river. This is a rather curious fact, as the two kindred dialects are separated by many intervening Bantu languages which are greatly dissimilar. The architecture, manners, and customs of the Bakundu-Barondo people are also those of the Duala and of the neighbouring Bantu tribes to the south and east, and save where direct Efik influence has been exerted and deliberate imitation has taken place, there is little resemblance to the mode of building, the customary practices and the current superstitions of Old Calabar. On the other hand, the Efik people have certainly received their architecture and their ethics from the Niger basin.

Perhaps, before proceeding further, a brief description of the geography of this Bantu Borderland may be of interest. With the exception of the intrusive volcanic mass of the Cameroons Mountains, the country lying between the Cross river on the west and the Cameroons river on the east is of the same general character. For an average distance of 40 miles from the sea, the soil is chiefly a thick stratum of alluvial mud overlying sand or gravel. Here and there, elevated islands of gravelly soil, with small fragments of porphyry and quartz, rise above the dead-level of the mangrove marshes, and these are invariably the site of native villages and plantations; or in certain districts, although there is scarcely any perceptible elevation above the marsh, little tracts of clean sandy soil may be met with which are at once distinguishable from a distance by the varied vegetation they support. But with these exceptions, the marshy, low-lying ground continues up to the base of the interior chain of hills where it abruptly gives place to the outcropping rocks. Here are often discernible the traces of an ancient shore-line, showing that this continuous fringe of flat marsh-land which borders so much of Western Africa was clearly formed by the constant alluvial deposit of the many streams and torrents perpetually coming down from the interior tableland, often thick with the red soil which they hold in solution and deposit when they slacken in their flow. Here, in this first abrupt rise of the land, going interiorwards, all the rivers have their last falls, which may either be magnificent cascades of 80 feet in descent, or mere rapids not impossible of ascent. The rocks are chiefly basalt, clay-slate, ironstone, porphyry, and quartz. Iron is clearly present in the soil. Mica is found in most of the stream-valleys, and there are traces of antimony.

The principal rivers draining this district are, beginning on the west,

the Cross river, which is a large and important stream, and rises somewhere in the highlands near the sources of the Binué and its affluents; the Old Calabar river, the Akwa (known on our charts as the "Great Qua"), the Akpayafé, the Ndiani, the Mboma-njinga (which three last form the Rio del Rey estuary); and round the eastern versant of the Cameroons Mountains, the Mungo (which Dr. Zintgraff has traced much farther to the north than it appears on the maps), and the Cameroons river and its affluents; besides which may be mentioned the two large streams recently discovered by Lieutenants Kund and Tappenbeck, the Njong and the Sannaga.

The tribes inhabiting the lower course and middle bend of the Cross river appear to have come from the north, north-east, and north-west; those inhabiting the upper Cross river and the country between that stream and the Ndiani river, from the east; and the Bantu tribes on the Mungo and the Mboma-njinga, from the south and south-east. In the district through which the Akpayafé river flows, above its last rapids, is an utter wilderness of dense forest, uninhabited by man. This, in fact, appears to be a kind of No Man's Land not yet reached by the tribes converging on it from north, east, and south.

To explain the migrations of these various races, I wish to give a brief hypothetical explanation of the origin of the Bantu family of languages and its non-Bantu congeners. We may imagine that very far back in the history of Africa there was a nest of flourishing negro tribes somewhere in the very heart of Africa, between the Shari and the Welle-Ubangi, who all spoke kindred languages, which, farther back still, had sprung from one mother tongue. From this no doubt populous centre emigrants had constantly been starting from the west before the period I am alluding to, and had carried with them tongues and dialects which have given rise to most of the languages in Western Africa between the Gambia and the Niger. But there still remained in this district north of the Congo, east of the West Coast watershed, south of Lake Chad, and west of the western affluents of the Nile, two flourishing and nearly-allied tribes, whom we will call the Bantu and the Semi-Bantu. The parent race from which these two were descended spoke a prefix-using tongue, which was connected in origin with the primitive Fula language, and possibly with the languages of Darfur and of Kordofan. The Bantu descendant somewhat extended and developed the prefix system derived from its mother, while in its Semi-Bantu sister the variety of prefixes and their use as relatives largely decreased. Some one of the many unrecorded convulsions which must have continually agitated communities of savage men and still re-act on them in savage Africa, drove the Semi-Bantu and the Bantu peoples from their common home, the former probably before the latter. The Semi-Bantu proceeded due west towards the Niger, and the Bantu turned to the south and south-east.

The Semi-Bantu greatly discarded and wore away the grammatical structure inherited from its mother and which its Bantu sister so developed and perfected, but retained in a great measure its primal stock of word-roots. In due time, among many other forms of speech we wot not of, the Semi-Bantu gave rise to most of the modern Binué languages, to the languages (such as Ibo) on the lower Niger, and to the languages spoken on the Cross river at the present time. These tongues, while retaining many roots in common with the Bantu, have a grammatical structure which lacks all, or nearly all, the Bantu features. The resemblance in vocabulary with the Bantu increases as you proceed eastward, but it is not to be explained by the theory of "loan-words," although these, too, also exist, because the similarity in the word-roots strikes too deeply into the language-system. The Semi-Bantu, in fact, bears to the Bantu proper the same kind of relationship as the Hamitic to the Semitic tongues.

The primitive Bantu tribe speaking the mother-tongue of all the Bantu languages moved away from its original home in a south and south-easterly direction, as I have already remarked, and probably located itself for some time in the district lying between the Welle, the Congo, and the Muta-nzige and Albert Nyanza lakes; in fact, somewhat to the north of the present Bu-regga * country. Here, no doubt, it settled down for a while and throve and multiplied, and here probably it received the ox, sheep, goat, pig, and domestic fowl from tribes to the north, to whom they had permeated from Egypt (*vide* the essay on the Bantu languages in my book on the 'Kilima-njaro Expedition,' and the note respecting the introduction of the domestic fowl into Africa). Rapid increase and its consequent troubles caused the primal Bantu people to again split up and its sections to part company, and the great Bantu invasion and occupation of the southern half of Africa began to take place. Except the feeble, dwarfish races of Akkas or Hottentots and Bushmen, there seem to have been few inhabitants to dispute southern Africa with the Bantu, and from their centre of activity in Bu-regga, they sent out streams of emigrants westward along the Welle and the Congo, eastward to the Nyanzas and the Zanzibar coast, and southward to Damaraland and Natal. I have more immediately to do with the western migration, at present. This has reached the Cameroons and the Borderland in the north-west from two directions. One immigration—the earlier one—came evidently right across from the Welle-Mobangi and occupied the Cameroons from the east and gave rise there to the modern tongues of Bayoñ, Ndob, Nsō, Boñkeñ, Basā, Baluñ, Abo, and Barombi—languages which, while retaining many archaic roots and forms yet exhibit signs of great corruption and

* The Ki-regga language spoken by the Ba-regga in Bu-regga is the most archaic in form—the least corrupted of the known Bantu languages. By "known," I mean those that have been written down and submitted to our examination.

"wearing-down," and have evidently suffered from their contact and struggles with alien tongues. The other and later intrusion of Bantu languages came up from the south along the coast, and is represented by the Duala of the Cameroons river, the Isubu of the Cameroons Mountains, and the Bakundu of the Mboma-njinga and the Upper Mungo rivers. The dialects of the island of Fernando Po appear to have originated from the earlier invasion of Bantu—from the "Abo" group—rather than from the later or "Duala" section. The Duala-Bakundu languages are less corrupted in their structure and phonology than the older Abo dialects, which first occupied the Cameroons country, and offer considerable resemblances with the Congo languages, with which they are connected by a string of intervening tongues. The language of the Fans, it may be interesting here to remark, appears to approximate more to the Abo type of Bantu speech than to the Duala-Congo tongues around it.

I may conclude this short paper by giving a list of the principal languages spoken in and around the Bantu Borderland in West Africa. I will divide them into their two classes of Bantu and Semi-Bantu, and I would premise that I have collected vocabularies of all that I mention and have made grammatical studies of some.

Class: SEMI-BANTU.

Name.	Locality.
Andoni	Andoni river (near Bonny).
Kwō	East bank of Opobo river and Kwo-Ibo river.
Efik	Lower Cross and Old Calabar rivers.
Ibo (various dialects)	Upper part of Niger Delta and western bank of Cross river.
Umon	Umon country on Cross river.
Ikun	Cross river, above Umon.
Akunakuna	Cross river, above Ikun.
Arun	Middle Cross river, above Akunakuna.
Atam	Upper Cross river.
Nki	Cross river, beyond Atam.
Manyon	Inland, eastward of Nki.
Mbudikom, or Mburikum	South-east of Nki, on extreme Upper Cross river.
Mbe	Interior, near Manyon.
Ejam, or Ezam, or Akpa	Between Upper Cross river and coast.

Class: BANTU.

Name.	Locality.
Ndob	Interior, near sources of Cameroons river.
Bonken	Upper Cameroons river.
Budiman	Cameroons river.
Balu	Lower Mungo river.
Abo	North of Cameroons river.
Barombi	On upper part of river Mboma-njinga and Rombi Mountains.
Bakundu (Barondo)	Upper Mungo and lower Mboma-njinga rivers, and sea-coast near Rio del Rey.
Bakwiri and Isubu	Cameroons Mountains and Bimbia.
Duala	Lower Cameroons river.

*The Earthquakes of May and June, 1887, in the Verny (Vernoe)
District, Russian Turkestan, and their Consequences.**

THE naturalist, Mr. Oshanin, and Mr. Gramenitsky, professors at Tashkent, were commissioned during the summer holidays to examine the effects of the earthquake of May 28th (June 10th).

The following account is, for the most part, taken from letters written by them and published in August (1887) in a local newspaper, the *Turkestan Gazette*, and the translation has been made with permission, Mr. Oshanin having kindly furnished further details.

The country round about Verny, which has been the scene of repeated earthquakes this year, is a mountainous, fertile, and picturesque region. Verny itself, the capital of the province of Semiretchia, lies at the very foot of the Trans-Ilian Alatau range, on both banks of the Lesser Almaty. This river, like all mountain streams, is remarkable for its swift current, in consequence of which, as well as of its shallowness, it is unfit for navigation, or even for floating down timber. But it supplies water for the town and for the irrigation of the surrounding fields.

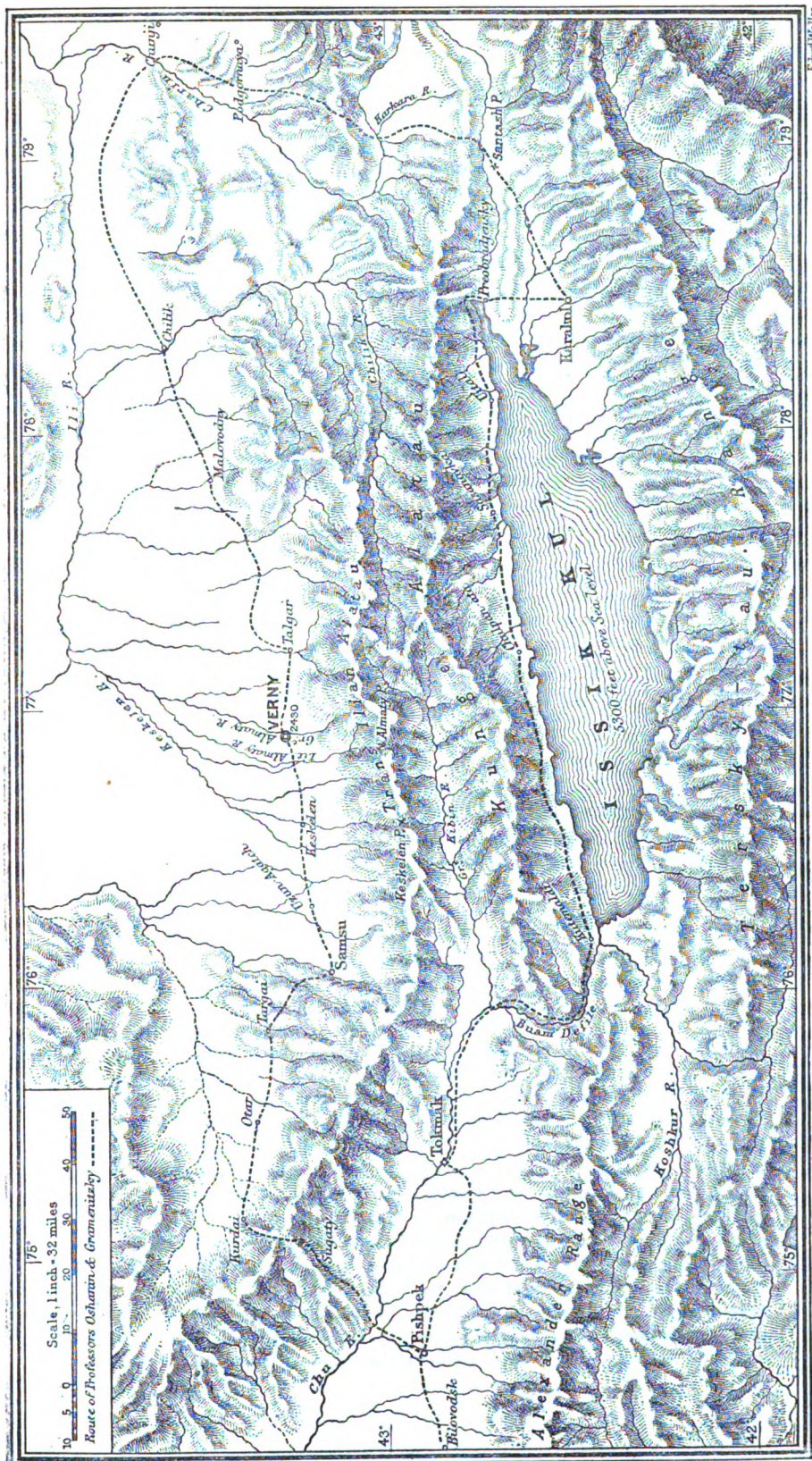
The town was founded in 1854. Thanks to the good choice of the site, it has grown rapidly and numbers at present 25,000 inhabitants. It is very regularly built—the streets are broad and straight, and cross each other at straight angles; they are bordered with trees: willows, poplars, elm-trees, and *Robinia pseudacacia*. The houses in the centre of the town were built of brick, but only in a few cases of burnt brick, the roofs being of iron or of planks; near the outskirts, in the so-called stanitsas, the majority of the houses are wooden, with plank roofs. Altogether, up to the earthquake of May 28th (o.s.), there were 1839 brick houses and 840 wooden ones, not more than 30 being two-storied.

The country beyond Verny gets gradually lower towards the river Ili. The soil is remarkably fertile near the town, and thanks to its nature and to extensive irrigation, it yields very rich harvests: wheat, oats, buckwheat and rye, barley and millet are grown, besides melons, water-melons, and cucumbers, without any attempts being made to improve the soil. Further northward, nearer the Ili, it becomes poorer and poorer up to the bank of the river which is composed of sand.

Immediately to the south of Verny rises the Trans-Ilian Alatau range, which is one of the most northern ranges of the great Thian-Shan system of mountains. The slopes are very steep—the mountain ridge is not more than 20 versts (13½ miles) distant from Verny, and has an average height of 10,000 feet, the town itself lying 2400 feet above sea-level. The snowy peaks which rise south of the town make the view most beautiful and imposing. The principal ones are Almaty (14,000 feet) and Talgar (about 15,000 feet).

All the northern slope of the Trans-Ilian Alatau is covered with luxuriant vegetation. The lowest zone is covered with tall thick grass, out of which rise masses of *Eremurus*, with pale pink blossoms, and two kinds of hollyhocks, one with white, the other with bright pink blossoms. Above this line is a forest zone, composed for the most part of apricot-trees, apple-trees, mountain-ash, aspen, different kinds of poplars, birch, bird-cherry, and ash. The principal bushes are sweet-briar, honeysuckle, hawthorn, spiræa, and raspberry, all of which are frequently joined together with creepers. Still higher up is a fir-tree zone, the species which covers it, the *Picea Schrenkiana*, being found nowhere else except in the Thian-Shan range. Then comes a grassy zone, above which are bare rocks crowned by snowy summits. Rising to

* Translated by Miss M. P. Hay, of Tashkent.



the ridge of the Trans-Iliian Alatau, the traveller discovers a parallel range, Kunge-Alatau, lower than the former and divided from it to the west by the valley of the river Kibin, tributary of the Chu, and to the east by the valley of the Chilik, one of the principal tributaries of the Ili. Beyond the Kunge-Alatau range extends a long elevated valley, 5400 feet above sea-level, bounded on the south by the Tersky-tau range. This valley contains the lake Issik-kul, the most beautiful and grandiose of the lakes of the Thian-Shan system of mountains, 107 miles in length and 20 in its greatest width. Issik-kul constitutes a completely locked basin, not a single stream flowing out of it. The river Chu comes to within a distance of $3\frac{1}{2}$ miles of it, and is connected with it by the stream Kutemaldy, which carries part of the water out of the river into the lake, the remainder continuing its course northwards across the Kunge-Alatau range, through the Buam defile. The water of the lake is briny, but the quantity of salt it contains is so small that cattle prefer it to the water of the mountain streams. By its deep blue colour it reminds one very much of the Lake of Geneva, but the impression produced by Issik-kul is much more striking. It is very much more extensive than the Lake of Geneva, and the mountains surrounding it are higher and more grandiose. The view is particularly beautiful towards the Tersky-tau range, which runs along the southern bank of Issik-kul, the snowy summits of the mountains forming a grand and picturesque background to the dark-blue waters of the lake. On the western half of the banks of Issik-kul there are no settlements, but on the eastern, Russians have settled in four villages, and in the town of Karakol, which lies at the distance of seven miles from the extremity of the lake. Along the northern bank runs a good post-road which joins Karakol to Verny, crossing the Buam defile. Another road, along which it is possible to drive to Karakol, crosses the Santash Pass. All other roads northwards from Issik-kul are but mountain-paths, and practicable only on horseback.

The whole of this region was shaken by the earthquake of May 28th. At Verny the shock was so sharp that all the stone buildings were damaged. In the town and its neighbourhood there were 328 victims, of which 180 in Verny itself.

The narrative of MM. Oshanin and Gramenitsky proceeds as follows:—

“Our arrival at Verny was delayed on account of our having stopped at the villages Uzun-Agatch and Keskelen to examine the consequences of the earthquake of May 28th (June 10th).

“On the road from Tashkent to Verny, the first noticeable traces of the earthquake are to be met with at the station Sugaty, the seventh from Verny, which lies on the northern slope of the Kurdai Pass, about 150 versts from Verny; but at this, as at the following stations, Kurdai, Otar, and Targai, they are limited to unimportant cracks in the stucco. The serious consequences of the catastrophe begin only near the station Samsu, about 47 miles from Verny. Even there the post-house (built of unburnt brick with a plank roof) withstood the shock, although there are several gaping cracks in the walls and stove, and the chimney destroyed. The following station, Uzun-Agatch, 25 miles from Verny, is situated in a village occupied by Russian peasants, emigrants from the mother-country, and containing at present 113 houses. The plan is very regular, the streets all running at right angles north to south and east to west. The majority of the houses are made of unburnt brick, with double-sloped roofs, covered with reeds, or seldomer made out of planks; the wooden constructions, few in number, did not suffer at all, the stoves alone having given way; but the brick houses sustained much damage, and became uninhabitable. For the most part, the walls from north to south gave way; in several houses they were split vertically in the thickness, the outer part falling away, whilst the inner remained in position, supporting the beams. The church, made of brickwork, with a wooden cupola, is covered with cracks; the stoves inside

have fallen to pieces; the crosses, the principal one as well as those on the frontons, are all bent, one being almost in a horizontal position. The services have been given up. To judge by the accounts of the inhabitants as well as by the direction of the fallen mud walls and isolated buildings, one must suppose the shocks came from the south-east.

"Keskelen or Lubovny, the last station before Verny, from which it is 16 miles distant, is inhabited by Semiretchia Cossacks. When this village was founded, hewing down trees in the hills for house-building had not yet been prohibited, so that most part of the constructions are wooden, with plank roofs. All the enclosures are mud walls. The village consists of 221 houses, the disposition being similar to that of Uzun-Agatch, as well as the character of the destruction, although the shock was sharper; but, thanks to the majority of houses being wooden, there is less destruction. One can form a fairly correct idea of the direction of the shock by the church-railing, consisting of separate brick pillars joined by squared beams: most of the pillars standing on the northern and southern sides of the railing fell; the top of the heaps of brick caused by their fall looking south-eastwards, i.e. towards the Aksai defile, from which, most probably, the earthquake spread. The church, built of wood, did not suffer, even the stucco falling away in very few places, and the services are continued. On the whole, all the wooden constructions at Keskelen withstood the earthquake very well, not one having given way. The inhabitants continued quietly to live in the wooden houses, the cooking alone being done in the open air, as all the stoves had fallen to pieces, and it being useless to attempt building up new ones while the shocks continued to be felt. The school at Keskelen, which was a solid construction of brick, in fact the best building in the place, is now quite useless; all the walls are severed from each other at the angles, and covered with cracks, part of the bricks having fallen away. The ceilings it is true have not fallen in, but on the whole the building hardly holds together. The shocks were so sharp that under the floor of the entrance (wooden with brick foundations) the brickwork gave way. Fortunately neither in Keskelen nor in Uzun-Agatch were any of the inhabitants killed or even seriously wounded. But up among the hills the case was different.

"Immediately southward from the post-road, between the station Samsu and Verny, and further eastward, extends the Trans-Ilian Alatau range. The hilly region, beginning about five or six versts from the road, is in no wise like the scorched slopes which the eye is accustomed to in Turkestan; it is covered with luxuriant grass. On this generally bright-green ground the eye is struck by yellow patches, which are to be found on the spots where the sod has slipped downwards and left bare the soil on which it lay. A few of these earth-slips produced by the earthquake of May 28th (o.s.) are first to be seen opposite Uzun-Agatch; eastwards, the number and size increase. We went to examine the earthslips in Keskelen defile, almost opposite the village of the same name. On this spot they are numerous enough, and for the most part to be found where the soil is loose or clayey (clay or loam (?) more probably the latter), some appearing in places where loose black earth lies under a bed of thick grass. Their thickness varies; most generally the sod, little more than two feet deep, slipped down; but in many places, especially in clayey (?) parts, the earthslips attained an important thickness (70 feet and more). The height from which they came varies also. In many parts the existence of earthslips is indicated only by a system of irregular cracks in the soil, varying from less than one foot to several fathoms in width; it is difficult to give an exact idea of their depth, as the bottom of the crack is filled up with earth. In other places the earthslips have travelled several fathoms, and their mass lies at the foot of the slopes in the defile. Some fell from a great height (as much as 350 feet) with such an impetus that they were driven not only across the defile, but as much as

15 feet up the opposite slope. In some places the defile was blocked up with the heaps of earth to such a degree that the stream which flows down it was turned into a lake, the water eventually accumulating so that it forced its way out. On the left-hand side a narrow defile, extending for several versts, is entirely covered with the mass produced by the earthslips, which hardened and formed a bridge across the whole defile, a stream having worked itself out a way underneath. One of the earthslips, under the pressure of the upper layers, not only travelled up the slope opposite to that from which it came, but continuing its progress, went over the top and down a second slope.

"Particularly interesting are the earthslips which took place on turf-pits; from the pressure produced by the fall of the upper layers the lower ones have been as if pushed upwards, the sudden upheavals and depressions thus produced owing their origin, for the most part, to the spongy nature of the turf-pits.

"The clayey (loam?) and black-earth soil of the hills contributed greatly towards the luxuriant growth, bright green grass covering them up to a considerable height, above which is a zone of fir-trees, crowned by snowy summits. The earthslips occurred especially in lower and middle height zones, where the grass vegetation is thickest, penetrating the lower portion of the woody region in which trees slipped down with the earth only in a few places. On the summits, and where rocks appear, there were no earthslips.

"The steepness of the slopes contributed towards the formation of the earthslips, as well as the nature of the soil, which explains the disasters that occurred in the hills: Kirghiz tents and Russian huts, as well as people and cattle which happened to be at the time of the catastrophe on the steep slopes or at their foot, were buried under the sliding mass. At Uzun-Agatch and Keskelen we heard of several tragic cases which took place in the hills at the time of the earthquake. In Keskelen defile five men extracting lime were buried under it. A Cossack was riding along the defile when an earthslip fell on him and covered his horse's feet so that it could not stir; the rider jumped off and ran up the opposite slope, and, glancing back, saw his steed disappear entirely. A Kirghiz, caught by an earthslip, was carried down the defile for about three versts, springing the whole time from place to place, so as not to fall between the disconnected masses, obtaining at last a firm footing when the earthslip stopped. In Kargaly defile (eastward from Keskelen), a forester and his family lived in a brick house. At the time of the earthquake he seized two of his children and ran out with them; his mother likewise ran out, the house falling at the same moment and smothering two other children. The father carried the two saved children to a neighbouring Kirghiz tent, and on returning saw that an earthslip had fallen on the house half-burying his mother and continuing to move slowly down the defile. All his efforts to rescue her were useless, as each one he made was followed by some new break in the loose soil. He endeavoured to stop the progress of the mass by implanting wooden spokes in the ground, and ran for help. The Cossacks he brought back with him could not make up their minds to unearth the old woman, as in doing so they themselves might be victims, so that the poor creature remained half-buried more than twenty-four hours. At last, a brave fellow, not being able to bear the sight of her agony, made up his mind to save her or perish with her. He succeeded in extricating her; her only injuries being severe bruises. Some Kirghiz related a still more tragic story: before their eyes a Russian put his wife on his back, and with two children in his arms, ran up the slope for more than half a verst, until, exhausted by the effort, he fell and was buried with all his family under the earthslip.

"The loose masses filling up the defile formed mud, which was carried down by the river Keskelen and formed a wide torrent, overflowing the whole valley and

inundating fields, meadows, and road. We saw similar and even larger torrents further on the road from Keskelen to Verny." It seems that at first these streams of mud were ignorantly mistaken by the people for lava, which added considerably to the panic. "They came out of the defiles of Kargaly, Aksai, Djaman-Bulak, and Greater and Lesser Almaty, that coming out of the Aksai defile being especially considerable. They cross the road in many parts, carrying a thick mass of mud which is drying in many places, rendering the journey from Keskelen to Verny still very difficult, and even impossible after nightfall. It is even more so on account of the great number of cracks in the ground which are often covered with a thick layer of mud to such a degree that it is impossible to follow their direction. These cracks are mostly parallel to the range of hills, some, however, intersecting the former. Their dimensions are still imposing, although, from accounts, they have been more considerable. Some are 4 feet wide and 12 feet deep at the present time. A Cossack was riding on May 28th (o.s.) from Verny to Keskelen while the severe shocks were continuing, the gaps broadening and narrowing under his eyes, dirty muddy water springing from out of them to a height of about 15 feet; in other cracks, the water, which is to be found very near the surface, as the great number of springy marshes prove, bubbled as while boiling. At Uzun-Agatch the wells are not more than 16 feet deep, but here the water must be still nearer the surface. Under the action of the upper layers brought into motion by the earthquake, it was pressed upwards.

"From the road, all the northern slopes of the hills are distinctly seen. The considerable quantity of light yellow patches on the bright green slopes is most noticeable in the Aksai defile. Eastward and westward from it, in the middle and lower zones, the surface is torn up, an immense light patch being on the Aksai itself, the result of a tremendous éboulement. Somewhat further eastward and westward destruction decreases. To judge by this and by the direction of the cracks at Uzun-Agatch and Keskelen, and in the town of Verny, as well as those on the road, one may conclude that the centre of the earthquake was either in the Aksai defile or in its proximity."

"... No description can give an idea of the dreadful picture Verny presents. The greater part of the brick buildings are standing, but parts of walls have collapsed, and the interior of the rooms can be seen through the gaps; the ceilings have fallen in, and there are heaps of bricks everywhere: in a word, complete desolation of which words cannot convey an idea!"

"... Examination proves that the southern side of buildings has suffered more than the northern; almost all the railings from east to west have fallen towards the south, whilst those from north to south have mostly withstood the trial; posts have also fallen towards the south. Besides the shocks which produced these effects there were evidently others in different directions, as witnesses assure, the simultaneity of these different shocks helping to explain the apparently circular motions. Although the inhabitants assure us there were motions upwards, the effects of the earthquake prove that they took place only sidewise.

"In the proximity of Verny, Lesser Almaty defile suffered comparatively less than those westward. However, opposite the summer residences of the Archbishop and Governor, we found important earthslips which had come down from considerable heights and uprooted huge trees which covered the hills up to the summit on the left side of the defile; others stopped half-way down and threaten to fall at any time. Somewhat lower down than the Governor's country seat, a narrow side defile opens to the left—in consequence of the earthslips it was entirely filled up with mud to a height of 70 feet. This mud found its way out and overflowed the premises of the Governor's house, so that no trace of them is left. There are still proofs that the

river Almaty changed its bed in many parts."—In a defile not distant from Lesser Almaty, a forester saw his house disappear under an earthslip, burying his wife and children; maddened with grief, and supposing all efforts useless, he rushed towards Verry, where he wandered for eight days. At the end of that time he bethought himself of extricating the bodies of his wife and children from under the ruins in order to bury them, and returned to where his house had stood and set to work. To his amazement he distinguished moans proceeding from below, and finally found all his family alive. At the time of the earthquake the samovar was prepared, with two loaves on the table. The mother fed her children with the bread and water at her disposal, herself taking nothing. She was in such a state of exhaustion that she died three days later.

"Westward from Lesser Almaty defile are to be found the defiles of Greater Almaty, Kargaly, Djaman-Bulak, and Aksai on the slopes of all of which there are earthlips. In Greater Almaty defile they begin as high up as the zone of fir-trees, yellow patches being often visible in the middle of the forests. Half-way up, the slopes seem positively furrowed by the éboulements, many of which attain considerable dimensions. A narrow strip of dry mud extends along the side of the bed of the river Kargaly to some way beyond the hills. At the time of the earthquake there was sufficient water in the river to liquefy this mud and carry it a great distance from the hills. The same thing has taken place even to a greater extent in the valleys of the Greater Almaty and Aksai. The entrance to the Djaman-Bulak, and Tasty-Bulak defiles, out of which flow unimportant streams, is blocked up by thick layers of mud. Evidently the earthlips and éboulements on the slopes of these defiles stopped the streams in their progress, eventually travelling slowly down towards the valley when water had collected to a certain degree, and undermined the lower layers.

"In Aksai defile where these accumulations are still more considerable, the greater part of the earthlips was likewise carried down towards the valley, the slopes alone being covered in the lower part of the defile, whilst further up, the heap of earthlips increases and forms a thick coating over the whole defile, the stream having succeeded in making itself a way down the middle. The thickness of the layers of mud attains as much as 70 feet, the defile being 700 feet broad. The undermining process is the same as in the other defiles. Half-way down the slopes there are new earthlips or éboulements, the dimensions of which are often formidable, as may be imagined by the fact of one composed of half a hill sliding down with a forest of fir trees which stood on it. In every direction from this huge éboulement, in the neighbouring defiles, the surface is as if torn-up. The supposition that this region was the centre of the destructive action of the earthquake seems to be confirmed by the fact that opposite the Aksai and neighbouring defiles all the habitations have been so completely destroyed that not a brick wall remains standing. A close examination of the slopes of Aksai defile shows them to be composed of loose sediment intermingled with many boulders. The character of the soil is so unsafe that the slightest pressure makes it crumble away, water turning the loose matter into mud, which at first moves down the defile in considerable and thick masses; it gradually becomes more liquid, and is carried down to the valley, filling up the ravines and overflowing the meadows and fields and even the road. The accumulation of earthlips will long supply material for muddy torrents down the valley.

"In the Aksai and neighbouring defiles there were many unfortunate cases at the time of the earthquake: cattle, tents, and people were buried under earthlips; so were several apiaries, watchmen's huts, foresters' houses, and heaps of firewood. A Kirghiz's apiary, which consisted of 500 hives, was buried, together with his family

and workmen, eight souls in all, not the slightest trace being left to help one to the precise spot where this apiary stood."

"... Eastward from Verny, the destructive effects of the earthquake decrease gradually. The earthslips near Talgar (17 miles from Verny), which are few in number, are to be noticed on the slopes looking eastward. The village itself has suffered less than Uzun-Agatch which is twice as far westward from Verny.

"Further eastward, the traces of the catastrophe are still less noticeable. In the village Malovodny four houses have become uninhabitable owing to the inferior quality of bricks in this locality.

"As we proceeded on our way, across the river Charin, skirting Chunji and Podgornaya, over the Temirlik Hills, across the Karkara valley and over the Santash Pass, we saw no traces of the commotion which has been, however, felt by the inhabitants.

"Destructive effects of the earthquake appear again on the northern banks of the Lake Issik-kul. In the town Karakol and the village Preobrajensky they consist of insignificant cracks. In the village of Uital gaping cracks are to be noticed, and several chimneys, stoves, and the wall of a house have fallen. In the village Sasanovka the brick church has many cracks, a wide gap being formed at the south-western corner; everything has been taken out of the church and the services discontinued; the school, which is opposite, is likewise covered with cracks; twenty-five of the peasants' houses are damaged and three are uninhabitable. Further westward, on the banks of the Issik-kul there are no habitations. But at the station Chulpan-ata, we came across curious effects of the earthquake: the bank itself of the lake, for a length of 1000 yards, has subsided and been submerged. This subsidence, which we heard so much about on the road to Verny, is nothing else but an earthslip similar to those we saw in the hills near this town—the upper layers, which were very loose, gave way and disappeared in the lake.

"There are hardly any other visible effects of the earthquake on the northern shores of Issik-kul, nor in the Buam defile, nor on the road to Pishpek, only cracks in the stucco at the stations, fallen chimneys and badly built walls in the town of Tokmak. From all accounts it would seem that in the valley of the river Kibin, between the ranges Trans-Ilian Alatau and Kunge Alatau, destruction was far from reaching proportions such as we witnessed on the northern slopes of the Trans-Ilian Alatau.

"In conclusion we may say that the destructive effects of the earthquake kept within a narrow range, extending to a distance of about 33 miles from the centre. Consequently the catastrophe was local, and owes its origin to the modifications which took place in that part of the hilly district of the Trans-Ilian Alatau which lies between Verny and Keskelen. Those who consider that there is a connection between the recent catastrophe and the earthquake at Bielovodsk and Karabalta two years ago are mistaken. Besides the length of time which has elapsed between the two, it is important not to lose sight of the fact that although the centre of the former earthquake is not determined, still it is certain that it took place in the Alexander range, and not in that of the Trans-Ilian Alatau.

"The supposition that the Issik-kul had an influence on the later catastrophe is incorrect. Not unfrequently did we hear the opinion that the Issik-kul, into which flow a considerable number of rivers and lesser streams, having no outlet, must have a subterranean one; that this underground current saps the lower strata of the earth's crust and contributes to cause earthquakes which will in time destroy the whole region. The decrease of water in the Issik-kul is to be explained in a much simpler way. It is a fact that the volume of water decreases, and that owing to evaporation which is causing the drying up of the closed basins of Turkestan by slow degrees, thanks

to its high level (5300 feet above that of the sea), and owing to its being surrounded by snowy summits which contribute to moisten the atmosphere, Issik-kul dries up more slowly than other lakes; however, thanks to its extensive area and the comparatively small quantity of water in its tributaries, the volume of water which evaporates exceeds that which it receives.

"As for the causes which produced the earthquake, we think that, considering the local character of the catastrophe and the absence of visible volcanic effects, they are restricted to hydro-chemical modifications of the crust of the earth."

The same paper, in the number for September 15th (27th), publishes the following:—M. Zenkoff writes from Verny:—

"Here earthquakes have not yet ceased, and if the almost imperceptible shocks are taken into account, one may say that we daily feel commotions. But there are frequently severe enough subterranean shocks accompanied with a rumbling noise and commotion, so that wooden houses shake and crack, and bricks or even sometimes a whole part of the construction fall away from the half-ruined brick buildings. I have noted shocks daily since August 21st (o.s.); the severest took place on the 22nd, 23rd, 25th, 28th, 30th, and 31st."

GEOGRAPHICAL NOTES.

The Emin Pasha Relief Expedition.—A succession of calamities has befallen the second half of the Relief Expedition, left by Stanley at the entrenched camp on the Aruwimi. Major Barttelot, the commander, having obtained the long-delayed supply of carriers promised by Tippu Tip for the transport of the remainder of the supplies for Emin Pasha, broke up the camp and started, with Mr. J. S. Jameson (second in command), Mr. Bonny, and 560 men, on the 10th of June. On the 19th of July he was murdered by the carriers, who were Manyema, a tribe of evil reputation, first made known to us by Livingstone. The disorganised party returned to Yambuya, losing, it is reported, a large number of loads, and on Mr. Jameson devolved the heavy task of attempting to get together a fresh body of carriers for a renewed effort. He appears to have proceeded with this object to the stations on the Congo, from one of which, Bangala, comes the saddening news of his death there of fever on the 17th of August. Thus two more brave men, whose loss is widely and deeply lamented, have been added to the roll of sacrifices to the spirit of African enterprise. Mr. Jameson joined the expedition as a volunteer naturalist, and had had good previous experience of African travel, having, as a gentleman of considerable private means, explored, with a well-equipped party, the Transvaal and Matabele-land.—In a letter accompanying a small collection which he sent from the camp on the Aruwimi, on the 15th August, 1887, he lamented the lack of opportunities of obtaining specimens there and on the journey, extracts from which we give, as of especial interest in view of the sad fate of the writer. He says, "All my dreams of collecting have proved dreams only, after all, for my duties have been

such that they entirely stopped all my chances. I have, however, picked up a few specimens about which we will have a long chat when I return, when I will bring you the notes in my diary concerning them. Please be careful to keep the numbers and letters attached to them, as they correspond to the numbers in my diary. Mr. Stanley would not allow me a single extra carrier to take my collecting things, and I consequently had to deprive myself of many of my clothes and little articles of luxury to make room for them. I am rather disappointed at the small number of species found here different from those on the Congo. You must tell me what you make of them when we meet, which will certainly not be before June or July at the earliest. The few specimens of birds I have obtained, I send to Mr. Bowdler Sharpe at the Natural History Museum. You may imagine how difficult it was to collect birds and insects. How often, when toiling along and driving the Zanzibaris with their loads, I have seen gorgeous specimens of all sorts of insect and bird life, and not been able to stir one foot out of the way to gather them. Please tell Mr. Solater when you see him that I have not seen a single antelope of any kind, and no game except hippopotami. As far as I can see there will be no better chance between this and Zanzibar."

Further Progress of Mr. Joseph Thomson in Morocco.—We have just received a telegram from Mr. Thomson in which he records further successful explorations in the Atlas. He says, "Left Morocco city 27th August. Driven back from the Urika valley, but attained our object by another route; made an ascent of the main range from Berraya, reaching an altitude of nearly 13,000 feet. We then skirted the base of the mountains to Imintanūt, whence we crossed by forced marches into the Sous valley, through tribes in revolt against the Caid. Were nearly besieged in the Kasbah of the Caid of the Imseggin by the Howara in revolt, but succeeded in escaping safely to Agadir, and reached Mogador September 17th. Intend to go north to Fez, Mequinez, and Tangiers, and reach England probably by the middle of December."

Dr. Holub's Journey in the Batoka Country.—The following are some notes on the explorations made by Dr. Holub, the well-known Austrian traveller, in the country between the Zambesi and Lake Bangweolo. After being delayed some months at Panda-ma-Tenka, a station to the south of the Zambesi, Dr. Holub, in company with his wife, left the Zambesi on the 10th June, 1886, and began his journey through the Batoka country. He was able to penetrate in a northerly direction, with a slight bearing to the east (crossing Selous's route of 1877-8), for a distance of 305 miles, and to survey the whole of his route. He says the country of the Batoka is wooded, but the forests are only composed of small trees, in which the tsetse fly abounds. He found that the Luengue (Livingstone's Loangwa) tributary of the Zambesi flows

2 x 2

from the north-west, and not from the north, as Livingstone supposed from native information. Another result of his exploration is the modification of our maps of the valley of the Zambesi, which has been represented as bordered in its middle course on both north and south by hilly, if not mountainous country. Dr. Holub, on the contrary, found that the river on the north is lined by a vast extent of low-lying marsh-covered land, where even in the cool season the traveller contracts intermittent fever. To the N.N.E. of the Batoka he explored the previously unknown region inhabited by the Machukulumbe, the people indicated on Livingstone's maps from hearsay information as the Bachukulumpo. Their country is watered by the Luengue, and is more elevated than that of the Batoka. The Machukulumbe formerly dwelt further north in the region of the lakes; they have for the last two centuries been established on the northern affluents of the Zambesi. They are described as a fine race, with aquiline nose; the men wear no clothing of any kind, and twist their hair into a chignon; the women wear pantaloons made of tanned hide, and shave their heads; they have the strange custom of knocking out their front teeth, which gives a strange appearance to their physiognomy. They are great cattle-breeders, and are probably richer in cattle than any other tribe in South Africa; the traveller estimated that there were 100 oxen to one hut. The presence of Dr. Holub among them was not acceptable, and partly by threats and partly by cunning they forced him to leave their country, but it was only after his camp had been pillaged that he retraced his steps, and with difficulty made his way back.

German Surveys in the Cameroons Region.—Our knowledge of the country comprised within the German Protectorate in the Cameroons region continues to be increased by the surveys executed by various German explorers. Dr. Zintgraff, who has made several excursions into the interior, has recently penetrated across the belt of virgin forest on the upper course of the Mungo river (about $5^{\circ} 30' N.$). His surveys determine the system of the western rivers, and confirm the supposition that the Massake is identical with the Makana, and the Rombi with the Memeh. At the same time Dr. Zintgraff reduces the exaggerated distances of Dr. Schwaz's route to reasonable figures. Among the other operations which have been carried out we may mention, the surveys of the estuary of the Rio del Rey by Captain von Schuckmann, of the Massake and Rumbi by Captain Stubenrauch, of the lower courses of the Sannaga and Njong, which Dr. Zöller navigated, by Lieutenant Vanselow, and lastly an exploration of the Abo and Wuri by the Imperial Commissioner Herr v. Puttkamer.

The Algerian Sahara.—M. Teisserenc de Bort, who is pursuing investigations on terrestrial magnetism in Algeria and the Sahara, made some few months ago a journey from Biskra to Laghuat through the Sahara,

in the course of which he travelled through the Algerian Djuf, a region about which little is known. He describes the country as hilly, with a gentle ascent from the "Shott" Melrir towards the north-west until it descends abruptly to the valley of the Ued-Djedi by a chalk cliff 200 feet in height, at the base of which flourishes an abundant Saharan vegetation. Several streamlets ooze down from the cliffs and give rise to infiltrations in the soil. Eastwards the country abounds in *ueds*, mostly dry, while to the north the plateau is deeply intersected by the Ued Salun. Djuf is covered with large square stone monuments, probably of Berber origin, which contain vaulted chambers, and were used as burial-places. They crown the cliff summits of Djuf, and are found here and there as far as the Ued-Djedi. M. de Bort determined the latitude of eight points and the longitude of nine with the aid of a chronometer; in two cases he was able to verify his longitudes by lunar observations.

Recent Survey Work by the French in Madagascar.—The following summary of the surveys carried out by French officers and others is given by M. Maunoir in his Annual Report on the Progress of Geography, published in the 'Quarterly Bulletin' (Part 1, 1888) of the Geographical Society of Paris. As regards the south of the island, the Minister of Marine has published a new map on which the hydrographical system is very different from that represented on former maps. For the first time the course of the river St. Augustine is accurately traced as the result of the survey executed by M. Grandidier, to whose earlier explorations and surveys we are indebted for so much of our knowledge of the geography of the island. On the north-east coast M. Favé, hydrographical engineer, has made some important surveys, especially at Diego-Suarez, and in the vicinity of that bay. Good work has also been done by Père Roblet, missionary of the Society of Jesus, and two French officers in surveying the imperfectly known route from Tamatave to the capital; while a civil engineer, M. Iribe, has constructed a hypsometrical map of this part of the country, which will be of great value in determining the best route between those two points. It is, however, in the centre of the island that the most important work has been accomplished. The provinces of Imerina and Betsileo have been triangulated by Père Roblet, who, besides having prepared a general map of Madagascar on the scale of 1:1,000,000, has constructed maps of these two districts on a smaller scale. An extent of country, measuring 310 miles in length and from 90 to 125 miles in breadth, has been accurately surveyed. This region comprises the upper and middle basins of all the rivers which have their sources in the central range of the island, and along the valleys of which lie the natural routes for penetrating into the interior, so that the work done by the eminent missionary and explorer is of the highest value as regards the development of the country. An efficient topographical brigade, formed at the instance of the French Resident, M. Le Myre de Vilers, has executed a detailed survey of the capital and its environs.

Indian Survey Work during 1887-8.—According to the monthly organ of the Survey of India, the following outturn of work has been made by various field parties during the past season:—In Bombay, No. 17 party has accomplished the detail survey on the 2-inch scale of 1086 square miles of country in Gujerat, and 290 square miles of forest survey in the Thana and Nandgaon districts on the 8-inch scale. Triangulation has been extended over an area of 1752 square miles, and 1294 linear miles have been traversed to provide points for future detail survey. In the Central Provinces, the party under Mr. G. H. Cooke has completed the traverse survey of the whole of the Jubbulpore district, the season's outturn being 1996 square miles. Another party, beginning operations in a new district, have accomplished 470 square miles of triangulation, 390 miles of traversing and 64 miles of actual survey. In the North-Western Provinces, the cadastral survey on the 16-inch scale of the Basti district was completed by the party under Colonel S. H. Cowan, as well as the remaining portion of the survey of the district of Mirzapore. The party under Lieutenant-Colonel J. E. Sandeman has completed the survey of the Gorakhpore district. In the Punjab, the party under Colonel F. Coddington has completed during the season 3062 miles of topographical test survey on the 2-inch scale, and 5826 square miles of traverse survey.

A new Route from Peru to the Upper Amazons.—With the view of finding the most direct and practicable route from Peru to the basin of the Amazons, M. Ollivier Ordinaire, French Consul at Callao, made some months ago a journey from Lima to Iquitos, the Peruvian naval station on the Upper Amazons. His itinerary, which was about 250 miles shorter than the old route via Moyobamba and occupied only 13 or 14 days as against 40 to 45 days in the latter case, was as follows. From Chicla he traversed the 70 miles to Ninacaca (on the road from Cerro de Pasco) on mule-back, then, after rapidly ascending to a height of 14,180 feet, he descended 3000 feet to the hamlet of Chipa. He next entered the Val d'Añil or "Valley of the Blue Lake," leading to the foot of the Sierra Huachon, which he traversed at an altitude of 14,435 feet. Several small lakes lie on the eastern slope whence rises the Rio Huancabamba. From this point to the Rio Palcaza instead of going northwards by way of the German colony of Pozuzo, the traveller turned north-east, and crossed the Yanachaga chain, thus saving a few miles. The western slope of this forest-covered range is intersected by numerous ravines, while the descent on its eastern side is very precipitous. Having crossed several small rivers, M. Ordinaire arrived at the confluence of the Chuchuras and Palcazu, and proceeded down the latter stream to the point where it flows into the Ucayali, whence he easily reached Iquitos.

Explorations in the Province of Parana.—Captain B. Mendoça is at present engaged upon an exploration of the western part of the province

of Parana, in discharge of a mission with which he has been entrusted by the Brazilian Minister for War, the principal end in view being the opening up of the province. His object is to lay down a practicable route from Guarapuava to the point of the discharge of the Yguazu into the Parana, thence along the course of the latter river, which is broken by rapids, to the celebrated waterfall of Sete Quedas, and from there into the valley of the Piquiry and back again to Guarapuava. A military colony is to be established at the junction of the Yguazu and the Parana in order to give greater security to the province.

Explorations on the Watershed of South Patagonia.—During the first three months of last year an exploration of the head-waters of the rivers Gallegos and Coile and of the eastern slopes of the Cordillera, was effected by Lieutenant A. del Castillo. Unfortunately the traveller is unable to throw any certain light upon the question of the fluvial connection between the lake-sources of the Santa Cruz and the Pacific, which has been supposed by earlier travellers to exist. He maintains, however, that a fresh-water canal discovered by him forms a connection between Lake Argentine, which is united with Laguna del Sur, and Last Hope Inlet on the Pacific coast. The fact that he did not follow this canal throughout its whole length, combined with other considerations, renders his hypothesis at best a doubtful one. It is therefore satisfactory to know that he started in December last upon another journey to the watershed, for the purpose of finally determining the question of the water-connection between the two oceans.

A new Expedition to the River Tapajos (Brazil).—We learn that a new expedition, sent out under the auspices of the Geographical Society of Rio de Janeiro, started at the end of June last from Cuyaba for the exploration of the region round the head-waters of the Tapajos. The exploring party, which is composed of three military engineers, Captain Telles, and Lieutenants Miranda and Villeray, are journeying by land to the vicinity of the sources of the Paranatinga, which, according to the results of von den Steinen's first Xingu expedition, flows apparently into the Tapajos. They will then follow the course of the Paranatinga until it joins the Tapajos as the Sao Manoel or Tres Barras.

Geographical Education in Portugal.—Professor Carlos de Mello, of Lisbon, has sent us a number of educational programmes referring to the Lisbon Industrial and Educational Institute and to secondary schools in Portugal, from which we are glad to see that geography holds a place of some importance in Portuguese education. Commercial geography, especially, seems to be fairly well taught, and Professor de Mello's own programme of a complete geographical course shows that he has very sound and thorough ideas as to what the subject ought to be.

CORRESPONDENCE.

Newfoundland.

ST. JOHN'S NEWFOUNDLAND,
August 10th, 1888.

SIR,—I perceive a letter from the Rev. Moses Harvey in one of the numbers of your Society's monthly Journal, in which that gentleman contradicts some remarks I made at the meeting of February 15th last, on Newfoundland. I do not wish to take up your space or carry on a correspondence in the Society's Journal, but request I may be allowed to state in a forthcoming number that I adhere to the statements I made on that occasion.

Mr. Harvey is entirely in error when he says I only knew the high bare ridges where the cariboo are found, and never entered the fertile wooded tracts described by Mr. Murray. My knowledge of this island extends over nineteen years, and I have travelled by water on river and lake many hundred miles in all directions, including the more fertile portions alluded to by Mr. Murray. I may as well mention that the parts described as fine agricultural soil in the interior, and which I found nothing but bog, rocks and scrub, are portrayed as such in a railway map, not the work of Mr. Murray—who was a personal friend, but whose views on the agricultural resources of the island I always considered of too sanguine a nature. This railway map appeared at the time it was proposed to build a number of lines in Newfoundland with British capital. Bonds were raised on the strength of land grants and other security. These are and have been ever in default, as no payment of interest has been made. The Newfoundland Land Company also pay no dividends.

I believe that fishermen can combine farming with fishing, and so increase their yearly income; but that any number of people, unless close to St. John's, can live and thrive by agriculture alone I deny, nor am I alone in this opinion.

The major part of the land in this island is of a poor, stony nature, requiring a great deal of manure. Along the coast fish and some sea-weed is used for this purpose. There are isolated tracts in some valleys where the land may be described as fairly good; but the amount of heat in the summer, coupled with a late spring and early autumn, is so uncertain, that cereals cannot be grown to advantage, for often they would not ripen; good root crops can be raised. Hay is seldom a good crop, unless in a very wet summer. This makes it all the more difficult to rear any number of stock, when it must be remembered they have to be kept up about half the year. In the maritime provinces of Canada, especially Prince Edward's Island, the seasons are much more favourable for raising fodder, and the land is very good, and not usually sandy and stony. There is very little natural herbage in this island on which stock can feed, though cattle will browse in the woods in summer; and there is hardly any "interval" land, viz. meadows flooded by rivers; add to which, there is no market, except St. John's, for farming produce, that is to say, the dealers in the out-harbours will not pay in cash for hardly anything except fur; the truck system being in force everywhere except for articles sold in the town of St. John's.

RICHARD DASHWOOD,
Major-General.

The Secretary R.G.S.

Hudson's Bay and Hudson's Strait as a Navigable Channel.

4, ADDISON GARDENS,

September 15th, 1888.

SIR,—To my observations on the above paper, published in the September number of the 'Proceedings' of the Society, I appended a note, giving a brief summary of the state of the ice in Hudson's Strait, as recorded at two of the stations on its shores, placed there for the purpose of observing the same, during part of the seasons of 1884, 1885, and 1886. I find it necessary to offer some explanation why there are so many days in which the strait was ice-obstructed.

The explanation is easy. The two stations referred to (Digges and Nottingham Island) between which lies the channel generally used in entering Hudson's Bay, are opposite to each other; Digges being to the south, Nottingham to the north, and these ice-blocks in the strait were often noticed on the same day at *both stations*, a significant fact, indicating that on these dates the whole channel from side to side was so ice-encumbered as either wholly or partially to stop a steamer's progress.

There is another and not unimportant difficulty in navigating a part of the strait, owing to the ship's compasses becoming almost entirely useless, either in consequence of the proximity of the magnetic pole, as has been suggested, or more probably by the action of some local attraction.

"On the same occasion Mr. Shelford stated that investigations of a committee of the Canadian Parliament showed that for more than 250 years sailors have counted upon having uninterrupted navigation in Hudson's Strait of from two and a half to three months each year."

There are no records in existence, that I can find, to show any such long continuous uninterrupted (by ice) navigation as "two and a half months."

J. RAE.

[With reference to the footnote mentioned by Dr. Rae in the foregoing letter, we have received a communication from Commodore Markham in which he states facts which contravene Dr. Rae's conclusions. He says Lieut. Gordon passed through the Strait in September 1884, and was clear on the 6th October, during which time he reports, in his official despatch, "no field ice was seen." At the three stations established on the shore of the Strait, "*no ice was seen*" during the months of September and October 1884, except at Stupart's Bay, where it is reported that ice began to form on the 22nd October, and by the 28th was probably from 3 to 5 inches thick. Dr. Rae has said nothing about the observations taken at these, the principal, stations (for they are actually in the Strait), and has quoted the observations taken from Nottingham Island and Digges Island, stations situated at the west end of the Strait, and in the immediate drift of the heavy ice coming down out of Fox Channel. As a proof that the Strait is clear of ice in September and October, the *Neptune* and *Alert* passed through during those months in three consecutive years, not only without any impediment from ice, but without seeing any. In September 1886, Lieut. Gordon reports such a heavy sea in the Strait that it was difficult to land, and impossible to get off any stores—a clear proof that there was no ice in the neighbourhood.—ED.]

PROCEEDINGS OF THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIATION.

BATH MEETING, 1888.

THE Section met in the large room of the Guildhall, and its meetings were very well attended.

The Committee of the Geographical Section was constituted as follows:—

PRESIDENT.—Colonel Sir C. W. Wilson, B.E., K.C.B., K.C.M.G., D.C.L., LL.D., F.R.S., Director-General of the Ordnance Survey.

VICE-PRESIDENTS.—E. Delmar Morgan; H. W. Bates, F.R.S.; Sir Lambert Playfair, K.C.M.G.; Lieut.-Gen. Richard Strachey, B.E., F.R.S.; General J. T. Walker, C.B., R.E., F.R.S.

SECRETARIES.—J. S. Keltie; H. J. Mackinder, M.A.; E. G. Ravenstein (*Recorder*).

COMMITTEE.—Rev. C. D. Ginsburg, D.C.L., LL.D.; Admiral Sir Erasmus Ommanney, C.B., F.R.S.; Professor Baron F. von Richthofen; General Sir H. E. L. Thuillier, B.A., C.S.I., F.R.S.; Coutts Trotter; The Right Rev. the Lord Bishop of Bath and Wells; Professor W. Boyd Dawkins, F.R.S.; The Hon. George Brodrick; The Very Rev. E. H. Plumptre, D.D., Dean of Wells; Rev. H. B. Tristram, D.D., F.R.S., Canon of Durham; A. Silva White, F.R.S.E.; Cope Whitehouse, M.A.; Colonel Woodthorpe, C.B., R.E.; C. E. D. Black; Rev. Canon A. J. Carver, D.D.

DELEGATE MEMBERS.—F. J. Faraday; H. R. Mill, D.Sc.

Thursday, September 6th.

Address of the President.—On opening the present Session of the Geographical Section of the British Association I cannot refrain from alluding to the last occasion, now nearly a quarter of a century ago, upon which it met in this city. The chair was then filled by one to whom I, in common with others of the younger generation of that day, must ever owe a deep debt of gratitude for many kindly words of advice and encouragement. Then, as now, popular interest centred in Africa, and Sir Roderick Murchison, on taking the chair, was accompanied by a group of distinguished African explorers. Some amongst us may remember the enthusiastic greeting accorded to Livingstone, and the heart-felt sorrow caused by the announcement that the gallant, chivalrous officer, whose name will ever live in history as the discoverer of the sources of the Nile, had been cut off in the fulness of his strength and vigour.

The African travellers of the present day have shown the same pluck, the same perseverance, the same disregard of personal risk and comfort as their predecessors. One African traveller, a distinguished officer of the German army, who hoped to have been with us, has this year been awarded the highest honour which the Royal Geographical Society can confer—its Gold Medal. Lieutenant Wissmann, who possesses all Livingstone's indomitable courage, his constancy of purpose, and his kindly feeling towards the natives, has twice crossed Africa, in its widest extent, without firing a shot in anger. He returned recently to Europe, filled, like the great English traveller, with indignation at the atrocities perpetrated by the Arabs on the blacks; and eager to find means, if such there be, of putting an end to, or at least mitigating, the unspeakable horrors of the slave trade. He is now organising

an expedition which has the double object of opening up the territory in Eastern Africa that falls within the sphere of German influence, and of bearing relief to Emin Pasha. In both enterprises we may heartily wish him "God speed!"

The light thrown upon the interior of the Dark Continent is the most striking feature of geographical exploration during the last twenty-five years; and it is really the outcome of the last eleven years, for it was only in 1877 that Mr. Stanley, by his remarkable journey, gave a new continent to the world. If Sir Roderick Murchison were now alive he would feel more than gratified at results which have been so largely due to his initiative. I propose presently to return to the interesting subject of Africa; but I would first draw attention to the influence which the natural features of the earth's surface have had, and are still having, in conjunction with other causes, on the trade routes and commercial relations between the West and the East, and more especially with India.

The great civilisations of high antiquity appear to have risen and expanded in four riversain districts; Chinese in the basins of the Hoang Ho and the Yang-tse-Kiang; Hindu in those of the Indus and the Ganges; Chaldean and Assyro-Babylonian in those of the Tigris and Euphrates; and Egyptian in that of the Nile. India is separated from China on the one hand by rugged, lofty mountain ranges, and the high-lying plateau of Thibet; and from Mesopotamia, on the other, by the Suleiman Mountains and the Perso-Afghan plateau. Intercommunication between these early seats of man's activity must therefore have been of slow growth. From Mesopotamia, on the contrary, there is easy access to the Nile basin by way of Syria and Palestine, and there are indications of traffic between these districts at a very remote period. Enquiry into the causes which first led to intercommunication and into the means by which it was effected is needless. Desire of gain, lust of power, were as much a part of human nature in the earliest ages as they are now. The former induced the pioneers of commerce to feel their way across trackless deserts, and to brave the hidden dangers of the sea; and for nearly three hundred years it led gallant men to seek a way to the wealth of India through the ice-laden seas of the Arctic region. The latter brought the great empires of Assyria and Egypt into hostile conflict, and carried Alexander to the banks of the Oxus and the Indus; and it is largely answerable for the land-hunger of European states in our own generation.

Nations rise, fall, and disappear, but commerce extends in ever-widening circles, and knows no limits. Efforts are constantly being made to discover and open up new fields of commercial activity and to connect the great centres of commerce by quicker and shorter trade routes. The earliest traffic was conducted by land; men travelled together in caravans for mutual protection, and rested where food and water were to be obtained; at the most important of these halting places cities were founded. As trade extended it became necessary to carry goods through independent tribes or countries, which often insisted on retaining the transit trade in their own hands, and this led to the rise of cities at points convenient for the transfer of loads and the exchange of the commodities of one country for those of another. Generally speaking, this early overland trade was co-extensive with the geographical limit of the camel. Next in order to land traffic came that by water, first on rivers, then on the sea; and cities naturally sprang up at places on the coast where the merchandise brought down the rivers in boats could, conveniently and safely, be transferred to galleys or ships suitable for coasting. After a knowledge of the monsoons had been acquired men began to trust themselves to the open sea; the ships were improved, and a system was established under which voyages were made, with great regularity, at certain seasons of the year, so that advantage might be taken of the periodic winds. Increased knowledge of the globe, improvements in the art of

shipbuilding, and the invention of the steam-engine have gradually led to the ocean traffic of the present day, conducted by large steamers which, regardless of wind and tide, follow the most direct course from one point to another. The trade routes of the world are subject to two great modifying influences, one physical, the other political. The inland trade of India, for instance, can only reach Central Asia and the West by way of Herat or Bamian; caravan roads across the deserts of Asia and Africa must follow lines of springs or wells; climatic conditions render all Polar routes impracticable; and the removal of a physical obstacle, by the construction of the Suez Canal, is now causing a remarkable redistribution of the channels of commerce. So, too, disturbance of traffic by war, or its designed destruction by conquerors; and great political changes, such as the establishment of the Persian Empire, the rise of Rome, the disruption of the Roman Empire, and the advent of the Arabs to power in Western Asia, divert trade from its accustomed routes and force it into new channels, to the ruin of some cities and states and the enrichment of others. The general tendency of trade so diverted is to seek, where possible, a maritime route, for water transport is not only less costly but less liable to interruption than land transport.

India, partly from its geographical position, partly from the character of its people, has always played a passive rôle in commerce, and allowed the initiative in commercial enterprise to rest with the West. The greatest advantages have always been derived from the possession of the trade between the East and the West, and, from a remote period, the nations of the world have contended for this rich prize. One state after another has obtained and lost the prize; England now holds it, but if she is to keep what she has obtained there must be a far closer study than there has hitherto been, of geography and terrestrial phenomena in their relation to commerce. Trade between the East and the West may be divided into three periods: the *first*, during which the limits of Oriental commerce were the eastern and south-eastern shores of the Mediterranean, closed with the foundation of Carthage about 800 B.C.; the *second*, or Mediterranean, period ended in the fifteenth century; the *third*, or Oceanic period, has lasted to the present day. In the first period there were two principal lines of traffic; the southern sea route following the coast-line, and the northern land route traversing Asia in its whole extent from east to west. There are indications of communication between China and the West so early as 2698 B.C.; and in 2353 B.C. an embassy arrived in China from a country which is supposed to have been Chaldæa. There is also an early notice of caravan traffic in the company of Ishmeelites, bearing spicery, and balm, and myrrh to Egypt, to whom Joseph was sold (Gen. xxxvii. 25-28). The earliest maritime people to appreciate the value of trade between the East and West were, apparently, those living along the south coast of Arabia. Happily situated between the Persian Gulf and the Red Sea, and separated by vast deserts from the great nations of Asia, the Sabæans were free from those alternations of industry and war which are so unfavourable to commercial pursuits; for centuries they possessed the commerce of India, and they became famous for their opulence and luxury. Sabæan ships visited Ceylon and the Malabar coast, and Sabæan merchants supplied Indian goods to Mesopotamia and Syria, as well as to Egypt and Ethiopia. The ships trading to the Persian Gulf discharged their cargoes near the mouth of the Euphrates, whence the traffic passed partly by river, partly by land, to the coast towns of Syria and Palestine, and through the Syrian and Cilician gates to Mazaca (*Kaisariyeh*), and Pterium (*Boghazkeui*); from the last place Indian goods found their way to Sardis and Sinope. The ships visiting the Red Sea landed goods at Elath, at the head of the Gulf of Akabah, for carriage by land to Tyre and Sidon, and on the western shores of the Red Sea for transmission to Meroë, Thebes, and Memphis. At the same time

silks from China, and gems from India, were carried overland to Chaldaea and Assyria; and Bactra (*Balkh*), "the mother of cities," rose and flourished at the central point of the transit trade. Egypt, with no timber for shipbuilding, a distrust of all foreigners, especially when they came by sea, and a settled dislike of maritime pursuits amongst her people, long neglected the opportunities afforded by her favourable geographical position. Tyre, Sidon, and other Phœnician towns, reached by easy roads from the Euphrates and the Red Sea, and from their situation commanding the Mediterranean, became centres of distribution for Indian goods; and the Phœnicians, gradually extending their operations to the Red Sea, traded with the ports of Southern Arabia, and even ventured to the shores of India. It was in this first period that the Jewish kingdom reached its widest extent. During the long wars of David's reign the Jews obtained possession of the land routes over which the rich products of India were carried to Tyre and Sidon; and Solomon did all in his power by building Tadmor in the Wilderness (*Palmyra*), by improving the port of Elath, and by carrying out other great works, to protect and facilitate the transit trade from which such large profits were derived. The Jews do not appear to have been the actual carriers, but many of them no doubt, following the example of their merchant-king, engaged in commercial pursuits, and wealth poured into the kingdom so that silver was made to be as stones in Jerusalem.

In the early portion of the second period the commercial prosperity of the Phœnicians reached its culminating point. Their colonies dotted the shores of the Mediterranean, and their ships passed the "Pillars of Hercules" to Great Britain and the western shores of Africa, and floated on the waters of the Red Sea, the Persian Gulf, and the Indian Ocean. The sea-borne trade of the known world was in their hands; wealth flowed into their cities, and in the markets of Tyre tin from Cornwall and amber from the Baltic were exposed for sale with the silks, gems, and spices of the far-distant East. The decline of Phœnicia dates from the establishment of the Persian Empire in the sixth century *B.C.*, and after the capture of Tyre by Alexander its commerce gradually passed into the hands of the Greeks. The Persian policy of closing the Persian Gulf to commerce forced the Indian traffic along the land routes. Babylon, which had become the emporium of Eastern trade, declined, whilst Susa and Ecbatana were enriched by the transit trade which passed through them and crossed the whole extent of the empire to the Mediterranean ports. The policy of Alexander was to secure the carrying and distribution trade of the world to the Greeks; and with this object he founded Alexandria, and intended, had he lived, to restore Babylon to her former splendour. Ptolemy, his successor in Egypt, used every means in his power to draw trade to Alexandria, and the new city soon rose to opulence and splendour. The Greek merchants obtained their Indian goods from the Arab traders whom they met in the ports of Southern Arabia; they landed them at Myos Hormos and Berenice on the western shore of the Red Sea, carried them by camel across the desert, and floated them down the Nile and by canal to Alexandria, whence they were distributed to the neighbouring parts of Africa and the coasts of the Mediterranean. This trade route remained unaltered until Egypt became a Roman province. Another stream of commerce passed by way of the Persian Gulf to Seleucia on the Tigris, and thence, partly by water and partly by land, through Aleppo to Antioch and Seleucia at the mouth of the Orontes; and a third followed the ancient highway from Central Asia to the ports of the Euxine and *Ægean* Seas.

After the rise of Rome all trade routes were directed upon the imperial city, which became a centre of distribution for the merchandise of the East. The Greeks still monopolised the sea-borne trade; and those of Egypt, recognising the advantage of their geographical position, took the direct trade to India into their hands, and

extended their voyages to Kattigara, the port of the Sinae (Chinese), in the Gulf of Tongking. Alexandria became the commercial capital of the Roman Empire, the distributing centre of the world for Indian and Asiatic goods, and a place of such wealth that one of the merchants is said to have been able to maintain an army. At the same time the old ports of Tyre, Beirût, Antioch, Ephesus, Byzantium, and Trebizonde maintained their position as *termini* of the land traffic. The extent of the intercourse between the East and the West during the Roman Empire is shown by the embassy of the Seres (Chinese) to Rome in the reign of Augustus, and by the several embassies to China, which followed that sent by Marcus Aurelius in 166 A.D., until the Arab Empire interposed; as well as by the fact that in the time of Pliny the Roman imports from Asia each year were valued at 100 million sesterces (about 800,000*l.*). Trade followed well-established routes which remained in use, with but slight modification, till the fifteenth century. There were three principal lines of communication through Central Asia, all leading from China across the desert of Gobi. The northern ran to the north of the Thien Shan by Lake Balkash to the Jaxartes, *Syr Darya*; the central passed along the southern slopes of the Thien Shan and crossed the mountains by the Terek Pass to Samarcand and the Oxus, *Amu Darya*; and the southern passed over the Pamir and through Badakhshan to Balkh. The northern route apparently went on from the Jaxartes, through Khiva to the Caspian, which it crossed, and then ran on to the Black Sea. Even at this early period trade filtered round the northern shores of the Caspian, and later, during the Middle Ages, there was a well-established trade route in this direction through Khiva to Novgorod and the Baltic, by which the northern countries received Indian goods. From the Oxus region reached by the central and southern lines there were two routes to the west. One passed through Merv, crossed the Caspian, ascended the Araxes to reach Artaxates and Trebizonde, or to descend the Phasis, *Rion*, to Poti, and then coasted the shores of the Black Sea to Byzantium. The other also passed through Merv, and running along the northern frontier of Persia, reached the shores of the Black Sea through Artaxates, or continued on through Mesopotamia, Syria, and Asia Minor to Byzantium. The land trade from India passed through the Bamian Pass to Balkh, and through Kandahar and Herat to Merv or Sarrakhs to join the great stream of Central Asian traffic. The greater portion of the carrying trade on these long lines was in the hands of the people dwelling between the Jaxartes and the Oxus, who had their centre at Samarcand; and these Sogdians, or Asi as they are called in the Chinese annals, fearing lest they should lose the profit on the transit trade, threw every obstacle in the way of direct communication between China and the Roman Empire. The difficulties which thus interrupted the land traffic gave an impetus to the trade by sea, and so benefited Alexandria and the cities in the Persian Gulf. The sea trade at this time was carried by way of the Persian Gulf and the Red Sea. In the first case the cargoes were landed at some port on the Euphrates or Tigris, whence the goods were carried by river and caravan up the valleys of those rivers and then through Syria to Beirût and Antioch, and through Asia Minor to Ephesus, Smyrna, Constantinople, and Samsûn. In the second case the merchandise was landed either near Suez, whence it was conveyed by caravan, canal, and river to Alexandria, and at a later date to Pelusium; or at the head of the Gulf of Akabah for transport to Syria and Palestine. The sea trade was to a great extent a coasting trade, and it appears to have been shared by the Greeks and the Arabs, and perhaps by the Chinese, whose junks were to be seen at Hira, on the Euphrates, in the fifth century.

On the disruption of the Roman Empire the Byzantines, with their capital situated on the confines of Europe and Asia, naturally became the intermediaries

between the East and the West, and they retained this position until the maritime towns of Italy, France, and Spain became sufficiently strong to engage in direct trade with the Mediterranean ports to which the produce of the East found its way. Until the seventh century the Sassanians held the lines of communication by land, and they did all they could to prevent Eastern produce from being carried over any other roads than those passing through their territory or by any other hands than theirs. In the sixth century they allowed an exchange of produce between the East and the West to take place at only three points; Artaxates for goods arriving from Central Asia; Nisibis for those from Central Asia and by the Tigris route; and Callinicum, *Rakka*, for those coming by way of the Persian Gulf and the Euphrates. Justinian attempted to free Oriental commerce from its dependence on the Sassanians by opening up new trade routes. The Sogdian silk merchants passed, outside of Persian territory, round the north end of the Caspian to meet those of Byzantium on the shores of the Sea of Azov and the Black Sea; the products of India were obtained from Ethiopian traders at Adulis, on the Red Sea; and Greek navigators, taking advantage of the monsoons, sailed direct from the southern end of the Red Sea to the Malabar coast and Ceylon.

In the seventh and eighth centuries the Arabs overran the whole of Central Asia, and the carrying trade by sea and by land passed into their hands. Profound modifications were thus introduced into the commercial intercourse between the East and the West. All land traffic from the East was directed upon Baghdad, which became the distributing centre whence goods were despatched by the ancient trade routes to the West, and which almost rose to the splendour of Babylon. On the sea the Arabs regained their old reputation; they sailed direct from the Red Sea to Cape Comorin, and from Ceylon to the Malay Peninsula, and extended their voyages to Kanpu on the delta arm of the Yang-tse-Kiang; they established factories in the Indian Ocean, and, in the eighth century, were so numerous in Canton as to be able to attack and pillage that city. Their only rivals were the Chinese, whose junks visited the Euphrates and Aden, and brought silks and spices to the Malabar coast to be there exchanged for the raw material and manufactures of the West.

The Eastern produce brought by the Arabs to the ports of the Mediterranean was conveyed to Europe by the merchants of Venice, Genoa, Pisa, and other towns, who also traded to Constantinople and the Black Sea. Venice from its geographical position was well adapted to be the intermediary between the East and Central Europe, and even before the rise of Islam a large share of the carrying trade of the Mediterranean had fallen into its hands through the apathy and luxurious indolence of the Byzantines. It is unnecessary to trace the rise of Venice or discuss the impetus given by the Crusades to commercial intercourse between the East and Western Europe; it will be sufficient to note that in the first quarter of the fifteenth century the carrying trade of the Mediterranean was wholly in the hands of the Venetians, and Venice had become the distributing centre for all Europe. Venetian fleets, well guarded by war galleys, sailed at stated times for Constantinople and the Black Sea; for Syria and Egypt; for France; for Spain and Portugal, and for Holland. From the ports in those countries, as well as from Venice herself, the products of the East were carried inland over well-defined trade routes, and cities such as Pavia, Nürnberg, and Bruges, the emporium of the Hanseatic League, rose to importance as *entrepôts* of Eastern commerce.

The victorious advance of the Turks, the fall of Constantinople, the piracy in the Mediterranean, and the termination of all intercourse with China on the decline of the Mongol dynasty in the fourteenth century, combined with other circumstances

to turn men's minds towards the discovery of a more convenient way to the East. India was the dream of the fifteenth-century merchant, and how to reach it by a direct sea voyage was the problem of the day. The problem was solved when Vasco de Gama reached the shores of India on May 20, 1498; and its solution was due to the wise policy of a great-grandson of Edward III., Prince Henry of Portugal, "the Navigator," who unfortunately died before success was attained. The discovery of the Cape route was no mere accident, but the result of scientific training, deep study, careful preparation, and indomitable perseverance. Prince Henry having determined to find a direct sea route to India, invited the most eminent men of science to instruct a number of young men who were educated under his own eye, and in a few years he made the Portuguese the most scientific navigators in Europe. The successful voyage of Vasco de Gama soon produced important results; the saving in freight by the direct sea route was enormous, and when it became generally known that the products of the East could be obtained much cheaper in Lisbon than anywhere else, that city became the resort of traders from every part of Europe. From Lisbon Indian commodities were carried to Antwerp, which soon became the emporium of Northern Europe. By these changes the trade of Venice was almost annihilated, and Lisbon became the richest commercial city in Europe. The Venetians had endeavoured to confine commerce within its existing limits, and to keep to the trade routes then in use. They had never made any attempt to enlarge the sphere of nautical and commercial enterprise, and the consequence was that their ablest seamen, imbued with the spirit of adventure, took service in the Western States. When the Cape route was discovered, instead of attempting to secure a share in the direct sea trade, they entered into an alliance with the Sultan of Egypt to crush the Portuguese, and built a fleet for him at Suez which was defeated by Almeida in 1508. After this defeat the trade of Venice soon passed away.

Since the discovery of the Cape route there has been one long struggle for the possession of the commerce of India; who should be the carriers and distributors of Indian commodities was for more than two and a half centuries a much contested point amongst the maritime nations of the West. At first there seems to have been a general acquiescence in the claim of the Spaniards and Portuguese to a monopoly of the southern sea routes, and this led to those heroic efforts to find a north-east or north-west passage to India which have so greatly added to our geographical knowledge. Failure in this direction was followed by attempts to reach India by the Cape in the face of the hostile attitude of Spain and Portugal. The mighty events which in turn transferred wealth and commerce from Lisbon to Antwerp, Amsterdam, and the banks of the Thames are matter of history, and it is scarcely necessary to say that at the close of the Napoleonic wars England remained undisputed mistress of the sea, and had become not only the carrier of all ocean-borne traffic, but the distributing centre of Indian goods to the whole world. A period of keen competition for a share in the commerce of India has again commenced amongst the states of Europe, and symptoms of a coming change in the carrying and distributing trade have been increasingly apparent since Africa was separated from Asia, nearly twenty years ago, by the genius of M. de Lesseps.

The opening of the Suez Canal, by diverting trade from the Cape route to the Mediterranean, has produced and is still producing changes in the intercourse between the East and the West which affect this country more nearly, perhaps, than any other European state. The changes have been in three directions.

First. An increasing proportion of the raw material and products of the East is carried direct to Mediterranean ports, by ships passing through the Canal, instead of

coming, as it once did, to England for distribution. Thus Odessa, Trieste, Venice, and Marseilles are becoming centres of distribution for Southern and Central Europe, as Antwerp and Hamburg are for the North; and our merchants are thus losing the profits they derived from transshipping and forwarding Eastern goods to Europe. It is true that the carrying trade is still, to a very great extent, in English hands; but should this country be involved in a European war the carrying trade, unless we can efficiently protect it, will pass to others, and it will not readily return. Continental manufactures have always been heavily handicapped by the position England has held since the commencement of the century, and the distributing trade would doubtless have passed from us in process of time. The opening of the Canal has accelerated the change to the detriment of English manufactures, and consequently of the national wealth; and it must tend to make England less and less each year the emporium of the world. We are experiencing the results of a natural law that a redistribution of the centres of trade must follow a rearrangement of the channels of commerce.

Second. The diversion of traffic from the Cape route has led to the construction of steamers for special trade to India and the East through the Canal. On this line coaling stations are frequent, and the seas, except in the Bay of Biscay, are more tranquil than on most long voyages. The result is that an inferior type of vessel, both as regards coal-stowage, speed, endurance, and seaworthiness has been built. These "canal wallahs," as they are sometimes called, are quite unfitted for the voyage round the Cape, and should the Canal be blocked by war or accident they would be practically useless in carrying on our Eastern trade. Since the Canal has been deepened they have improved, for it has been found cheaper to have more coal-stowage, but they are still far from being available for the long voyage round the Cape. Had the Canal not been made a large number of fine steamers would gradually have been built for the Cape route, and though the sailing ships which formerly carried the India and China trade would have held their own longer, we should by this time have had more of the class of steamer that would be invaluable to us in war time, and our trade would not have been liable, as it is now, to paralysis by the closing of the Canal.

Third. Sir William Hunter has pointed out that, since the opening of the Canal, India has entered the market as a competitor with the British workman; and that the development of that part of the empire as a manufacturing and food-exporting country will involve changes in English production which must for a time be attended by suffering and loss. Indian trade has advanced by rapid strides, the exports of merchandise have risen from an average of 57 millions for the five years preceding 1874 to 88 millions in 1884, and there has been an immense expansion in the export of bulky commodities. Wheat, which occupied an insignificant place in the list of exports, is now a great staple of Indian commerce, and the export has risen since 1873 from 1½ to 21 million hundredweight. It is almost impossible to estimate the ultimate dimensions of the wheat trade, and it is only the forerunner of other trades in which India is destined to compete keenly with the English and European producers.

The position in which England has been placed by the opening of the Canal is in some respects similar to that of Venice after the discovery of the Cape route; but there is a wide difference in the spirit with which the change in the commercial routes was accepted. Venice made no attempt to use the Cape route, and did all she could to prevent others from taking advantage of it; England, though by a natural instinct she opposed the construction of the Canal, was one of the first to take advantage of it when opened, and so far as the carrying trade is concerned she has hitherto successfully competed with other countries.

It is only natural to ask what the result of the opening of the Panama Canal will be. To this it may be replied that the Canal, when completed as a maritime canal, without locks, will promote commercial intercourse between the eastern and western coasts of America; will benefit merchants by diminishing distances, and reducing insurance charges; and possibly divert the course of some of the trade between the East and West; but it will produce no such changes as those which have followed the construction of the Suez Canal.

The increasing practice of the present day is for each maritime country to import and carry the Indian and other commodities it requires, and we must be prepared for a time when England will no longer be the emporium of Eastern commerce for Europe, or possess so large a proportion as she now does of the carrying trade. So great, however, is the genius of the English people for commercial enterprise, and so imbued are they with the spirit of adventure, that we may reasonably hope loss of trade in one direction will be compensated by the discovery of new fields of commercial activity. The problem of sea-carriage has virtually been solved by the construction of the large ocean steamers which run direct from port to port without regard to winds or currents; and the only likely improvement in this direction is an increase of speed, which may possibly rise to as much as thirty knots an hour. The tendency at present is to shorten sea-routes by maritime canals; to construct canals for bringing ocean-going ships to inland centres of industry; and to utilise water carriage, wherever it may be practicable, in preference to carriage by land. For a correct determination of the lines which these shortened trade routes and great maritime canals should follow, a sound knowledge of geography and of the physical condition of the earth is necessary; and instruction in this direction should form an important feature in any educational course of commercial geography. The great problem of the future is the inland carrying trade, and one of the immediate commercial questions of the day is—who is to supply the interiors of the great continents of Asia and Africa, and other large areas not open to direct sea traffic? Whether future generations will see

“The heavens fill with commerce, argosies of magic sails,
Pilots of the purple twilight, dropping down with costly bales,”

or some form of electric carriage on land, may be matter for speculation; but it is not altogether impossible to foresee the lines which inland trade must follow, and the places which must become centres of the distributing trade, or to map out the districts which must, under ordinary conditions, be dependent upon such centres for their supply of imported commodities. The question of supplying European goods to one portion of Central Asia has been partially solved by the remarkable voyage of Mr. Wiggins last year, and by the formation of the company of the “Phoenix Merchant Adventurers.” Mr. Wiggins started from Newcastle-on-Tyne for Yeniseisk, the first large town on the Yenesei, some 2000 miles from the mouth of that river and within a few hundred versts of the Chinese frontier. On the 9th October, 1887, he cast anchor and landed his cargo in the heart of Siberia. The exploit is one of which any man might well be proud, but in Mr. Wiggins's case there is the additional merit that success was the result of conviction, arrived at by a strict method of induction, that the Gulf Stream passed through the Straits into the Kara Sea and that its action, combined with that of the immense volume of water brought down by the Obi and Yenisei, would free the sea from ice and render it navigable for a portion of each year. The attempts of England to open up commercial relations with the interior of Africa have too often been marked by want, if not open contempt, of geographical knowledge, and by a great deficiency of foresight; but the competition with Germany is forcing this country to pay

increased attention to African commerce, and the formation of such companies as the British East African Company, the African Lakes Company, and the Royal Niger Company is a happy omen for the future.

Another branch of the subject to which attention may be briefly directed is the fact that it is becoming increasingly evident that manufactures cannot profitably be carried on at a distance from the source of the raw material and the destination of the products. In India, for instance, where the first mill for the manufacture of cotton yarn and cloth was set up in 1854, there are now over 100 cotton and jute mills with 22,000 looms and 2,000,000 spindles; and similar changes are taking place elsewhere.

I am afraid that I have frequently travelled beyond the sphere of geography. My object has been to draw attention to the supreme importance to this country of the science of commercial geography. That science is not confined to a knowledge of the localities in which those products of the earth which have a commercial value are to be found, and of the markets in which they can be sold with the greatest profit. Its higher aims are to divine, by a combination of historical retrospect and scientific foresight, the channels through which commerce will flow in the future, and the points at which new centres of trade must arise in obedience to known laws. A precise knowledge of the form, size, and geological structure of the globe; of its physical features; of the topographical distribution of its mineral and vegetable products, and of the varied forms of animal life, including man, that it sustains; of the influence of geographical environment on man and the lower animals; and of the climatic conditions of the various regions of the earth, is absolutely essential to a successful solution of the many problems before us. If England is to maintain her commanding position in the world of commerce she must approach these problems in the spirit of Prince Henry the Navigator, and by high scientific training fit her sons to play their part like men in the coming struggle for commercial supremacy. The struggle will be keen, and victory will rest with those who have most fully realised the truth of the maxim that "knowledge is power."

I may add that if there is one point clearer than another in the history of commerce it is this:—that when a state cannot effectually protect its carrying trade in time of war, that trade passes from it and does not return. If England is ever found wanting in the power to defend her carrying trade, her fate will only too surely, and I might almost say justly, be that of Venice, Spain, Portugal, and Holland.

I will now ask you to turn your attention for a few moments to another subject—Africa. In 1864 Sir Roderick Murchison alluded to the great continent in the following terms: "Looking at the most recent maps of Africa, see what enormous *lacunæ* have to be filled in, and what vast portions of it the foot of the white man has never trodden." It was then impossible to give a general sketch even of the geography of Equatorial Africa. Tanganyika and Nyassa had been discovered, and Speke and Grant had touched at a few points on the southern, western, and northern shores of the Victoria Nyanza; but we were still in ignorance of the drainage and form of the immense tract of country between the Tanganyika Lake and the Zambesi; and the heart of Africa, through which the mighty Congo rolls, was as much unknown to us as the centre of America was to our ancestors in the middle of the sixteenth century. There are now few schoolboys who could not give a fairly accurate sketch of the geography of Central Africa; and a comparison of the maps published respectively in 1864 and 1888 will show how rapidly the *lacunæ* of which Sir Roderick complained are being filled in. There is still much to be done, and it is precisely in one of the few blank spots left on our maps that the man who may well be called the Columbus of Africa has so mysteriously disappeared. The dis-

covery of the course of the Congo by Stanley has been followed by results not unlike those which attended the discovery of America by Columbus. In the latter part of the nineteenth century Africa has become to Europe what America was in the sixteenth century. Events march more rapidly now than they did then, and the efforts of the maritime nations of Europe to secure to themselves some portion of African territory and some channel through which they can pour their products into Central Africa are rapidly changing the condition of the Dark Continent.

The roads over which the land trade of Equatorial Africa now passes from the coast to the interior are mere footpaths, described by Professor Drummond in his charming book 'Tropical Africa' as being "never over a foot in breadth, beaten as hard as adamant, and rutted beneath the level of the forest bed by centuries of native traffic. As a rule these footpaths are marvellously direct. Like the roads of the old Romans, they run straight on through everything, ridge and mountain and valley, never shying at obstacles, nor anywhere turning aside to breathe. Yet within this general straightforwardness there is a singular eccentricity and indirectness in detail. Although the African footpath is on the whole a bee-line, no fifty yards of it are ever straight. And the reason is not far to seek. If a stone is encountered no native will ever think of removing it. Why should he? It is easier to walk round it. The next man who comes that way will do the same. . . . Whatever the cause, it is certain that for persistent straightforwardness in the general, and utter vacillation and irresolution in the particular, the African roads are unique in engineering." No country in the world is better supplied with paths; every village is connected with some other village, every tribe with the next tribe, and it is possible for a traveller to cross Africa without once being off a beaten track. The existence nearly everywhere of a wide coast plain with a deadly climate, and the difficulties attending land transport in a country where the usual beasts of burden, such as the camel, the ox, the horse, and the mule, cannot be utilised, will probably for many years retard the development of the land trade. On the other hand, the Congo with its wide-reaching arms, the Niger, the Nile, the Zambesi, the Shiré, and the great lakes Nyassa, Tanganyika, and the Victoria and Albert Nyanzas offer great facility for water transport, and afford easy access to the interior without traversing the pestilential plains. Already steamers ply on most of the great waterways—each year sees some improvement in this respect; and a road is in course of construction from Lake Nyassa to Tanganyika which will tend, if Arab raiders can be checked, to divert inland traffic from Zanzibar to Quilimane, and will become an important link in what must be one of the great trade routes in the future. It is possible, I believe, with our present knowledge of Africa, and by a careful study of its geographical features, to foresee the lines along which trade routes will develop themselves and the points at which centres of trade will arise; but I have already detained you too long, and will only venture to indicate Sawákin, Mombasa, Quilimane, or some point near the mouth of the Zambesi, and Delagoa Bay, as places on the east coast of Africa which, from their geographical position, must eventually become of great importance as outlets for the trade of the interior.

The future of Africa presents many difficult problems, some of which will no doubt be brought to your notice during the discussion which, I trust, will follow the reading of the African papers; and there is one especially—the best means of putting an end to slave-hunting and the slave-trade—which is now happily attracting considerable attention. It is surely not too much to hope that the nations which have been so eager to annex African soil will remember the trite saying that "property has its duties as well as its rights," and that one of the most pressingly important of the duties imposed upon them by their action is to control the fiends

in human form who, of set purpose, have laid waste some of the fairest regions of the earth, and imposed a reign of terror throughout Equatorial Africa.

The following papers were then read:—

Le Canal de Panama, au point de vue géographique, maritime et commercial. Par M. F. DE LESSERS.—The canal of Panama crosses the narrowest part of the American isthmus, and, including 6 kilom. of approaches, its total length will be 74 kilom. Its width is to be 22 m., its depth 8·25 m. Provisionally ten locks are to be constructed, so that the canal may be opened in 1890, the cost of its subsequent completion according to the original plan being defrayed out of the dues levied upon the ships frequenting it.

Ships approaching the eastern terminus of the canal pass to the south of the island Manzanillo, upon which stands the town of Colon, joined to the mainland by a railway. They then reach the new town Port Christophe, which rises upon a level tract of land won from the sea, and is the headquarters of the Canal Company. It is here the canal begins, and as far as Obispo (45 kilom.) it follows the valley of the Chagres, crossing that river repeatedly. The canal, as far as Gatun (9 kilom.), traverses a lowland covered with aquatic plants. Thence, as far as Bohio Soldado (24 kilom.), a few hillocks, 20 to 30 m. in altitude, rise above the plain. Between Bohio Soldado and San Pablo (35 kilom.) the canal crosses the alluvial plain of Tavernilla. At San Pablo, where the hills begin, and where the canal is crossed by the railway on a swing bridge, it is proposed to construct the second lock. The third lock will be constructed at Gamboa, 1 kilom. below Obispo, and at the same point a dam or barrage will be built across the Chagres, the discharge of which varies, according to the seasons, between 13 and 1600 cubic meters in the second. This dam will extend from the Cerro Santa Cruz to the Cerro Obispo, a distance of 150 meters, and it will convert the upper basin of the Chagres into a huge reservoir, the surplus waters of which will pass over a weir into a leap running parallel with the canal. Between Gamboa and the summit level of the canal in the great cutting of La Culebra (50 kilom.) there will be two locks. Thence, as far as Miraflores (62 kilom.), on the Pacific slope, the hills gradually decrease in height, and the descent will be effected by means of five locks. Near Pedro Miguel (61 kilom.) the railway for a second time crosses the canal. The hilly portion of the isthmus, between the 36th and 48th kilom., consists of trachytic tufas and dolerites. Near Paraiso, and as far as the 60th kilom., the basalt is covered with alluvial soil to a width varying between 100 and 1000 meters. Thence, as far as the Pacific, the bottom of the Rio Grande valley consists of stratified rocks and clay, easily removed by dredging machines.

Between Gamboa and Emperador (51 kilom.) the canal crosses repeatedly the Rio Obispo, a tributary of the Chagres. Between La Culebra and Paraiso it intersects the Rio Grande, which flows to the Pacific. Several canals of derivation have been excavated to carry off the surplus waters of these rivers, and to open up a new debouchure for the Rio Grande, which will enter the sea to the north of the canal. From the last lock (62 kilom.) to the Pacific (68 kilom.) the nature of the soil presents no difficulties whatever.

In November 1887, communication by water had been opened up for 17 kilom. on the Atlantic and for 8 kilom. on the Pacific side. Since then these portions of the canal have been widened and deepened. In order to open the canal, as proposed, in the beginning of 1890, it will be necessary to remove 40,000,000 cubic meters of soil, including 10,000,000 of hard rock, and during the first half of 1888 7,479,400 cubic meters were actually excavated.

The opening of the canal will not only obviate the difficult navigation round Cape Horn or through Magalhaens strait; it will also benefit shipowners in conse-

quence of the great saving of distance, as may be seen from the following tabular statement :—

	Distance at present.	Distance through the Canal.	Saving.	Per Cent.
From London to—	geo. miles	geo. miles	geo. miles	
San Francisco	20,400	9,900	10,500	51
Australia	19,800	13,200	6,600	33
Sandwich Islands	18,000	9,600	8,400	46
From New York to—				
Valparaiso	12,900	4,800	8,100	63
Callao	13,500	3,600	9,900	73
San Francisco	19,200	5,100	14,100	74

The canal will thus considerably shorten the passage for vessels proceeding from the east coast to the west coast of America, and there can be no doubt that it will also be availed of by European vessels proceeding to the east during part of the year, when the passage through the Suez Canal and the Red Sea presents difficulties.

Admiral Davis of the American Navy estimated in 1866 that vessels of 3,094,070 tons burden, carrying merchandise to the value of 467,831,130 dollars, would avail themselves of the canal when completed, and that the saving thus effected would amount to 49,530,390 dollars.

In 1879 M. Levasseur, of the Institut, made an estimate, according to which the tonnage likely to pass through the canal in 1889 would amount to 7½ million tons, including 2 millions for European vessels using it as an alternative route. This tonnage, if realised, would yield a revenue of 112,500,000 francs.

Later authorities have confirmed these estimates. Commander Taylor, an American, estimates the probable traffic at between 6 and 7 million tons. Mr. Jas. Abernethy, President of the Institute of Civil Engineers, fully recognises the advantages of the Panama Canal. M. Stoess, the German Consul at Liverpool, looks upon a traffic of 6 million tons as a minimum. M. Paul Leroy Beaulieu thinks that about one-third of the rapidly increasing commerce between Europe and Australia would take its way through the Panama Canal. A well-informed writer in *The Nineteenth Century* maintains that the opening of the Panama Canal will bring about a stupendous change in the direction of the world's commerce. Mr. A. Slaven, the director of the American Contracting and Dredging Company, stated to a reporter of the *Sun* newspaper that even if the canal cost 400 million dollars, it would yet yield a handsome revenue to its promoters. The New York Chamber of Commerce, in a report addressed to Congress in March 1888, expresses the opinion that a Central American ship-canal could depend upon an annual traffic of between 8 and 9 million tons. M. Van Nehns, a Dutch engineer, estimates the annual increase in the tonnage of the vessels communicating between the two oceans at 1 million tons; and as this traffic already amounted to 7 million tons in 1884, it would amount to 12 millions in 1889.

There can thus exist no doubt that the canal will ultimately prove remunerative. It is likely to prove even more remunerative than the Suez Canal, which is only available for steamers.

Meteorological Conditions of the Red Sea. Communicated by Lieut.-General STRACHEY, Chairman of the Meteorological Council.

Sea Temperatures in the Neighbourhood of Cape Guardafui. Communicated by the same.

These two papers will be published, with diagrams, in the November No.

The Salinity of the Clyde Sea Area. By HUGH ROBERT MILL, D.S.C., F.R.S.E.—The observations made by the staff of the Scottish Marine Station on the Clyde sea area during the years 1886 and 1887 show that the salinity of the bottom water changes comparatively little with the season, always diminishing slightly from the sea towards the head of the various lochs. The surface water also freshens close to the shore and towards the upper part of the lochs; but its salinity at any time depends largely on the actual rainfall and on the height and steepness of the surrounding mountain walls, being sometimes quite fresh and freezing in severe frosts. The saltiest surface water was almost invariably found near the Otter Spit in Loch Fyne, 50 miles from the open sea; the tidal current moving from deep to shallow water carries up the saltier lower layers. Wind-currents produce even more striking effects. When a gale blows *down* a loch, the saltiest surface water is found at the head, even though a stream enters in the immediate neighbourhood, in the position where, normally, it is freshest. This is in consequence of the upwelling of salt water from beneath to replace the surface layers driven away by the wind, and fully confirms Mr. Murray's theory (suggested by temperature observations) of the circulation of water in enclosed basins. Following are the average results of from eight to fourteen observations at a few selected stations spread over two years, the density being that at 60° F. (15·56° C.).

Station.	Surface.	Bottom.	Depth.
			fathoms.
Mull of Cantire	1·02536	1·02540	60
South of Arran	1·02459	1·02503	25
Off Brodick	1·02444	1·02522	80
Off Skate Island	1·02446	1·02508	106
Outside Otter Spit, Loch Fyne	1·02461	1·02497	35
Off Strachur	1·02226	1·02458	75
Head	1·01435	1·02427	15
Head of Loch Strivan	1·02153	1·02465	12
Off Dunoon	1·02325	1·02476	50
Head of Loch Long	1·01945	1·02440	10
Mouth of Gareloch	1·02223	1·02407	20
Head	1·02238	1·02333	10

Sea Temperature on the Continental Shelf. By HUGH ROBERT MILL, D.S.C., F.R.S.E.—The name "continental shelf" is applied to the shallow and gradually sloping ground from the sea-margin out to the 100-fathom line, beyond which the descent to abysmal depths is abrupt. The British Islands rest on one of the widest continental shelves in the world, and the present paper summarises observations made by the author on its western edge. The observations were carried out at the request of the Fishery Board for Scotland on Board H.M.S. *Jackal* in July and August 1887, and consisted of lines of serial temperature soundings from the north-west coast of the island of Lewis seawards to beyond the 100-fathom line. This portion of the continental shelf is terraced, and the slope varies in different places. It is broken by the long Flannan bank and the small circular bank of St. Kilda, and grooved by several deeper channels. The *form* of the curves of vertical distribution of temperature and the direction of the isotherms in the temperature sections show that the water reaching the seaward edge of the shelf from the ocean consists normally of a layer more than 25 fathoms deep at a uniform temperature of 56°, resting on a mass of water at a temperature of 48° and 49°. The action of waves partially mixes the two layers, and they were found separated by a zone about 15 fathoms thick, in which the temperature changed rapidly with depth. The prevailing westerly wind and eastward tidal current produced changes in this

typical arrangement of layers in exact relation with the configuration of the sea-bed. The warm layer, meeting no resistance from inequalities on the bottom, flows on to the shore and tends to accumulate there, flowing back as an undercurrent, and so giving a deeper layer of warm water or a wider zone of mixture near the land. The effect of a bank is different: the colder mass of water runs up the slope, reducing the thickness of the warm layer over the bank and maintaining a lower temperature on the other side.

The chief conclusion arrived at is that the temperature of sea-water depends little on local air-temperature, but mainly on the configuration of the sea-bottom and the direction of the currents caused by tide and wind. The observations on salinity bear out these conclusions.

Perspective Maps and Common Maps. By ARTHUR W. CLAYDEN, M.A., F.G.S.—The author called attention to the inaccuracy essential to all maps, and to the great distortion which may occur in maps of large areas, like those of continents or oceans. Notice was especially drawn to the comparative uselessness of the scale of miles usually attached to such maps. It was suggested that for elementary educational purposes such maps could be advantageously replaced by others drawn in true perspective, as a better notion would thereby be given of the true figure of the earth and the relative proportions of its chief features.

"Little Russia." By E. DELMAR MORGAN.—The region known as "Little Russia" has no definite landmarks; some place its centre at Kharkof, others at Poltava, but at these cities the author on a recent tour was referred to Kief, and at Kief to Luof, or Lemberg, in Austrian Galicia, if he wished to acquaint himself thoroughly with the so-called Little Russian movement. Kharkof is a rising city, a Russian Chicago, with a university founded about eighty years ago, and a select literary circle. The Little Russians are a finer race than the Great Russians; they are enterprising colonists, and the charge of laziness made against them is unfounded. Their social and political tendencies are different to those of the Great Russians. Whereas these favour communal tenure and the patriarchal family life, Little Russians are all for individualising property and severing the family tie. In earlier times their *Gromada*, answering to the *Mir* of Great Russia, freely discussed local affairs.

Report of a Committee appointed for the purpose of drawing attention to the desirability of prosecuting further research in the Antarctic Regions. Presented by Admiral Sir ERASMUS OMMANNEY.—The Reporter stated that the Committee had been in communication with scientific bodies in Australia, Tasmania, and New Zealand, and that the Government of Victoria had voted the sum of 5000*l.* towards an Antarctic Expedition on condition that the Imperial Government contributed a similar amount. This offer had been declined by Her Majesty's Government, but in terms which encouraged the belief that they were favourably disposed to such an enterprise if undertaken on a proper scale. The Committee having fulfilled its duty of calling attention to the subject, did not ask to be reappointed.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian F.G.S.*)

EUROPE.

[**Germany.**]—Forschungen zur Deutschen Landes- und Volkskunde im Auftrage der Central-Commission für wissenschaftliche Landeskunde von Deutschland, herausgegeben von Dr. Richard Lehmann und [for vol. ii.] Dr. A. Kirchhoff.

Stuttgart, Engelhorn, 1886: 8vo., erster Band, pp. 555; zweiter Band, pp. 449. Price 14s. and 20s. (*Dulau.*)

The task undertaken by the Commission on the Scientific Geography of Germany is a formidable one. The results, to judge from the two volumes issued, are sure to be of great value and great interest, and Dr. Lehmann and Dr. Kirchhoff are to be congratulated on the success of their editorship so far. The field embraced in the Commission's work is not confined to political Germany; it will include all Continental European countries where the German language is spoken in one form or another, or where German colonists have settled; such as a large part of Austria, Switzerland, Holland and Belgium, Denmark, Saxon Siebenburgen in Hungary, and even the German colonists in Southern Russia. "Landeskunde" is taken in its widest sense, a sense to express which there is no word in English. What that sense is may be seen from the subjects dealt with in these first two volumes. In the first volume Dr. E. Geinitz starts with a paper on the Soil of Mecklenburg. Dr. Richard Lepsius, in a paper of about 60 pages, treats of the Upper Rhine Plain and its bordering mountains. Dr. Hahn, in a memoir covering over 70 pages, discusses in a highly instructive and well-informed fashion the subject of the towns of the North German Plain, with special reference to the formation of the ground. These are followed by memoirs of varying length on the Munich Basin, a contribution to the physical geography of Southern Bavaria, by Herr Chr. Gruber; the Mecklenburg Reefs and their relation to the Glacial Period, by Dr. E. Geinitz; the influence of the mountains on the climate of Central Germany, by Dr. R. Assmann; the Nationalities of the Tirol and the changing features of their distribution, by Dr. H. J. Bidermann; the Paleography of the Cimbric Peninsula, that is the disposition and settlement of the tribes of that peninsula, as determined by natural and historical conditions, by Dr. K. Jansen of Kiel. In the second volume, again, we have memoirs on such subjects as the following:—The Nationalities of Bohemia, by Dr. L. Schlesinger; Nationality and Language in Belgium, by K. Brämer; The Distribution and Arrival of the Germans in Silesia, by Dr. K. Weinhold; Mountain Structure and Surface Conditions of Saxon Switzerland, by Dr. A. Hettner; New Slavic Settlements in South Germany, by Dr. H. J. Bidermann; and the Various Types of Settlement in the High Alps, by Dr. F. Löwe, who endeavours, among other things, to classify the topographical conditions that have guided the planting of villages and towns. Thus it will be seen that varied as are the subjects dealt with in these two volumes, they all come legitimately within the geographical field.

ASIA.

[**India.**—Gazetteer of the Simla District, 1888–89. Compiled and published under the authority of the Punjab Government. 8vo., pp. viii., 116, and xxiv.

Gazetteer of the Ludhiána District, 1888–89. Compiled and published under the authority of the Punjab Government. 8vo., pp. xi., 230, and xxv. [Presented by the Secretary of State for India.]

A mass of very valuable information relating to the Districts of Simla and Ludhiána has been collected and condensed for these two works. The subjects treated of are the topography of the districts, with their mineralogy, fauna and flora: their history: their people, with statistical details of their social and religious life, tribes and castes, village communities and tenures: their production and distribution; including agriculture and live stock; occupations, industries and commerce; prices, weights and measures, and communications: their administrations and finance: their towns, municipalities, and cantonments. There is also to each gazetteer a very complete appendix of statistical tables relating to the meteorology, population, religions, languages, castes, diseases, education, tenures, forests, agriculture, live stock, manufactures, revenue, and crime of the two districts: but, valuable as these two works undoubtedly are, there is evidence of haste in their compilation, and errors are perceptible at a glance. Thus, in the table headed "Leading Statistics" of the Simla Gazetteer, the total square miles of the district are stated to be 18: whilst the average square miles under crops are given as 20. The total population is given as 42,945,

whilst the number when classified under the different religions only amounts to 39,588. On page 10, the range of the edible pine (*Pinus gerardiana*) is stated to be 5000 to 10,500 feet, whilst on the next page it is given as 7000 to 10,000 feet. The editor himself complains in the prefaces of the short time allowed him, which certainly does not appear to have been sufficient for a thorough revision of the two works.

AFRICA.

Foucauld, [Vicomte] Ch. [De].—Reconnaissance au Maroc, 1883–1884. Paris, Challamel et Cie., 1888: 4to., Texte, pp. xvi. and 195, Atlas, 21 sheets. Price 2l.

M. Foucauld's journey to Morocco has added more to the knowledge of the geography of this country than that of any previous explorer. As M. H. Duveyrier states in his report on the work, M. Foucauld has revised 430 miles of routes previously traversed and added 1400 miles of his own. He determined 45 longitudes and 40 latitudes, besides 3000 altitudes. Starting from Tangier on June 20th, 1883, he went by Tetuan to Shishawan, where begins the territory of the independent Berbers known as the Rif, whose fanaticism is notorious. Shishawan is a large city, rarely visited, and dangerous to enter. M. Foucauld travelled disguised as a Jew. Returning to Tetuan, he proceeded southwards to El Khasar by a new route, and thence to Fez and Seforo, over ground already traversed. From Fez he penetrated eastwards into this dangerous country as far as Taza, finding for the first time the course and configuration of Wad Yennawen. Proceeding from Fez to Mequinez, M. Foucauld entered upon one of the newest and most interesting sections of his journey. Thence over a distance of five degrees to the south his journey was really one of original discovery in the province of Tâdela, and further south in the perfectly independent territory of the Berbers. From Mequinez to Khasba Beni-Mellâl, where the first folds of the Atlas begin, M. Foucauld found the country at first hilly, then mountainous, the mountains being well wooded. Near Bôl-El-Jad begins the stony and arid Plain of Tâdela, showing signs of fertility at Wâd Um Er-Rebbia, on which is built the Khasba of Tâdela, this fertility continuing as far as Khasba Beni Mellâl. On his return to Algeria, M. Foucauld surveyed another section of the same zone between Debou and Ujeda. He passed through Demnat, where Mr. Thomson has been so recently, and among the main chain of the Atlas made observations, adding materially to our knowledge of its altitudes. Moreover, over a distance of 200 miles, the route of M. Foucauld passed at a distance from the Atlas which enabled him to trace upon the map the direction of the chain. But at 30 miles to the north and 90 to 120 miles to the south, he found the main range flanked by parallel chains which had previously been quite ignored. A little south and north of the 30th degree of latitude, the crest of the Lesser Atlas marks an important line of distribution. To the north M. Foucauld still found himself in the temperate zone, the flora recalling that of Southern Europe. The southern slope again is quite Saharan in character, marked by a climate of extremes. To the south of the Lesser Atlas M. Foucauld found a singular chain of considerable length, the Jebel Bani, a simple sharp-cut rocky crest, only about a mile wide at the base and from 750 to 1000 feet high, on the south of which rises the dry bed of the well-known Wadi Dra'a. Affluents of the Dra'a cut their way through the Jebel Bani. In all this region, M. Foucauld made careful and detailed explorations, proceeding southwards and westwards to Agadir, and northwards to Mogador, where he arrived in January 1884. His return journey was much more to the eastwards, crossing Morocco in a north-east direction and entering Algeria at Ujda in May 1884. The value of M. Foucauld's contribution to our knowledge of Morocco cannot be overestimated, both of the country and of the many different tribes among whom he sojourned. The text abounds with instructive sketches, sections, and panoramas of the various features that came under his observation, while the Atlas is on so large a scale and so full of carefully plotted details, that undoubtedly it forms an important addition to the geography of Morocco.

Oran et l'Algérie en 1887. *Notices Historiques, Scientifiques et Économiques* [Edited by Dr. Georges Seguy.] Oran, Paul Perrier, 1888 : 2 vols. 8vo., pp. 346 and 282, maps and illustrations. (Association française pour l'avancement des Sciences.) [Presented by Sir Lambert Playfair, K.C.M.G.]

The present work was prepared for this year's meeting at Oran of the French Association for the Advancement of Science by the committee of that city, and edited by Dr. G. Seguy. The editor states in the introduction, that one of the principal ends which he and the compilers had in view when undertaking the task, was to combat and counteract much that is said and written about Algeria in France, where so many false views and erroneous opinions concerning it have been propagated, that measures have been adopted by the mother country often contrary to the wants of the colony, and heresies sanctioned that are prejudicial to its interests : and that, whilst stoutly contending against the proposal of abandoning Algeria altogether on the one hand, and of a wholesale naturalisation of the Arabs on the other, they are even sanguine enough of making a convert of M. Rochefort, and of turning him into one of their most zealous supporters. With the exception of the first 118 pages of the first volume, comprising the preface, introduction, and four chapters devoted to the government, settlement, finance, and education of the colony, the whole remainder of the volume treats of the Department of Oran ; its anthropology, ancient topography, botany, mineral waters, geology and mineralogy, and agriculture, with one chapter on the Morocco frontier : and the second volume gives the detailed topography of the various *arrondissements* of the same Department. The work is considerably marred by the want of an index and of a table of maps and plates.

Thys, [M. le Capitaine].—Au Congo et au Kassai. Bruxelles, Weissenbruch : 8vo., pp. 60. Price 2½ francs. [Presented by the Author.]

Captain Thys made a journey up the Congo and Kassai last year on behalf of the "Compagnie du Congo pour le Commerce et l'Industrie." This volume contains his report, originally given in the form of lectures to the Belgian Society of Engineers and the Belgian Geographical Society. The report refers mainly to the navigability of the rivers and the capacity of the State for industrial and commercial development. He describes the various sections of the river ; his method of constructing his detailed chart of the Kassai, the character of the natives from an industrial standpoint, organisation of the State, climate and emigration, and several other matters of practical interest. It needs scarcely be said that Captain Thys takes a very rosy view of the situation. There are three maps : one of the Congo Free State, with Captain Thys's itinerary, and another of the Lower Congo between Boma and Matade ; while a third is a fragment of the railway survey map. Captain Thys's map of the Kassai and Lulua is published by the Brussels National Institute of Geography in a separate cover.

GENERAL.

Hinman, Russell.—Eclectic Physical Geography. Cincinnati, Van Antwerp & Co. [1888] : 8vo., pp. 382. Price 1 dollar. [Presented by the Publishers.]

Notwithstanding the unfortunate designation "Eclectic," Mr. Hinman's Physical Geography is altogether one of the most satisfactory that has come under our notice. It does not give too much of any one thing ; it is not over-weighted by its geology or its physics, but gives just so much of them and of other subjects as strictly belong to the geographical domain. The book is a geography in the true sense. It is to be regretted, however, that Mr. Hinman had not the courage to omit the physiographical section altogether. Geography ought now to be able to stand on its own legs, and writers of geographical textbooks should take for granted that students have already acquired the necessary preliminary knowledge. Again, we wish Mr. Hinman had written a complete geography, and not dealt with a fragment of the whole subject. The hard and fast division into physical and political geography should be discountenanced by all who desire to maintain that geography has a distinct field of its own. Mr. Hinman deals with the environment with unusual ability, but he has

omitted the environed. He has given us 'Hamlet' without the Prince of Denmark. Apart from this objection, Mr. Hinman has a perfect grasp of his subject, knows how to use common English terms with precision and clearness, and has a happy knack of introducing apt and striking but not eccentric illustrations. The book is well balanced throughout, and abreast of the latest results of research. Any one ignorant of physical geography might safely take the book as an instructor, while to the well-informed teacher every section will prove highly suggestive. The first twenty-eight pages of the book are devoted to a brief account of "Some general laws of Nature," such laws as underlie the phenomena with which physical geography deals. Mr. Hinman's brief explanation of such phenomena as conduction, convection, radiation, latent heat, &c., are models of clearness and conciseness. The six parts into which the book is divided deal with—I. The Earth as a Planet; II. The Atmosphere; III. The Sea; IV. The Land; V. Weather and Climate; VI. Life. Of course the largest space is devoted to the land, which is dealt with in ten chapters:—1. Division of the Land; 2. Surface of the Land; 3. Structure; 4. Springs; 5. Streams; 6. Work of Streams; 7. Glaciers and Lakes; 8. Mountain Structure and Land Sculpture; 9. Earthquakes; 10. Volcanoes. Mr. Hinman is so sure of his ground and so careful that it will be difficult to pick many faults, even in detail. Perplexing details as a rule he avoids. Thus in referring to animal life, and especially to man, he contents himself with dealing with well-selected types. He gives only three types of mankind (with illustrations), woolly-haired, straight-haired, wavy-haired, only briefly but clearly referring to varieties. So with plants and animals. Naturally many of the illustrations are drawn from America, though he does not neglect other parts of the world. The illustrations (maps and woodcuts) are of the highest class, and are never intended for show, but solely for use. To show the unhackneyed way in which Mr. Hinman treats his subject, we give an extract or two. On the "Continuity of the Sea" he writes:—"The Pacific, Atlantic, and Indian Oceans are wide and open at the south, where, together with the Antarctic, they form a continuous and uninterrupted sea as far north as Cape Horn. . . . From this sea each ocean extends northward as a great bay or channel. At the tropic of Cancer the Indian Ocean encounters Asia and ends; at the Arctic Circle the Pacific Ocean practically ends at the shallow and narrow Behring Strait, leaving the Atlantic alone to make a broad connection with the Arctic Ocean, and carry the continuity of the sea into the frozen region about the North Pole." Again, writing of "Regions of Elevation and Depression" on the surface of the earth, Mr. Hinman takes the following broad and scientific view:—"The mean height of the land above sea-level is a little less than half a mile. As the mean depth of the sea is $2\frac{1}{2}$ miles, the total mean height of the land above the sea-floor is about three miles. An elevation half as great (that is, $1\frac{1}{4}$ miles above the sea-floor) may therefore be taken to divide the regions of *elevation* in the earth's crust from the region of *depression*. In other words, not only the land, but all parts of the sea-bottom on which the water is less than one mile deep, are to be considered as regions of elevation, while only the sea-bottom at greater depths is to be considered the region of depression. . . . The map shows that there is but one great region of elevation. It extends entirely across the northern hemisphere, and at three places penetrates the southern hemisphere to about 40° S. lat. The height of this continuous region of elevation is not uniform; at certain localities it does not reach quite to the level of the sea, but enough of it protrudes above the sea to constitute almost all ($\frac{1}{1000}$ ths) of the land on the globe. It may therefore be called the continental plateau. The only other regions of elevation rise in small isolated areas in various localities, the largest being about the South Pole and in the tropical Pacific Ocean." Mr. Hinman writes with unmistakable clearness on the folds of the earth's crust (their varied character), and especially on the varied work of erosion. The book is one which might well be adopted in this country until superseded by a better.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Bohmen.—Neueste Eisenbahn und Strassenkarte von —. Scale 1:600,000 or 8·2 geographical miles to an inch. Von J. E. Wagner. Prag, Kytka. Price 1s. 6d. (*Dulau.*)

—— Neueste Handkarte von —, mit der politischen Eintheilung. Scale 1:600,000 or 21·9 geographical miles to an inch. Prag, Kytka. Price 1s. (*Dulau.*)

Bulgaria.—Carte du Chemin de Fer Bulgare de Tzaribrod-Sophia-Vakarel. Dessinée par A. Bayer, 1888. Scale 1:200,000 or 2·7 geographical miles to an inch. Typo-Lithographie "B. Silber," Sophia. Price 2s. (*Dulau.*)

This is a very roughly drawn map, on which the names of places are given both in French and the Russian character. The chief feature of interest it contains is a section of the country between Tzaribrod and Vakarel drawn on the horizontal scale of 1:200,000, that adopted for the vertical scale being 1:5000. A small inset map showing the line of railway communication between Paris and Constantinople, and a table of distance by rail between the principal stations, are given.

Deutschen Reiches.—Karte des —. Scale 1:100,000 or 1·3 geographical miles to an inch. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme 1888. Sheets: 89, Greifswald; 91, Fritzw; 473, Friedland in Schl.; 522, Mettendorf; 558, Mannheim; 591, Gmünd; 630, Colmar i. Elsass. Price 1s. 6d. each sheet. (*Dulau.*)

France.—Carte de —, dressé par le Service Vicinal par ordre de M. le Ministre de l'Intérieur. Scale 1:100,000 or 1·3 geographical miles to an inch. Paris, 1888. Sheets: III.—15, Brest; IV.—16, Châteaulin; IV.—17, Quimper; VI.—16, Pontivy; VII.—14, Plancoët; IX.—14, Avranches; XVII.—8, Béthune; XX.—21, Autun; XXI.—21, Le Creusot; XXIII.—28, Grenoble; XXIII.—34, Aix; XXIII.—35, Marseille; XXIV.—35, Brignoles; XXV.—35, Lorgues. Hachette et Cie., Paris. Price 7d. each sheet. (*Dulau.*)

—— Carte de — et ses colonies dressée par Menuel. Paris, Derancou & Co. 2 sheets. (*Dulau.*)

Harz.—Neueste Karte vom —, von O. Diercke und E. Gaebler. Scale 1:200,000, or 2·7 geographical miles to an inch. Hannover, Meyer. Price 3s. (*Dulau.*)

Nederlanden.—Kaat van het Koninkrijk der —, van E. de Geest. Scale 1:800,000 or 4·1 geographical miles to an inch. Amsterdam, Seyffardt. 4 sheets. Price 7s. (*Dulau.*)

Neu-Vorpommern und der Insel Rügen.—Karte von —, von Dr. Fr. von Hagenow. Scale 1:200,000 or 2·7 geographical miles to an inch. Greifswald, Scharff Nachfolge. Price 4s. 6d. (*Dulau.*)

Oesterreichisch - Ungarischen Monarchie.—Specialkarte der —. Scale 1:75,000 or 1 geographical mile to an inch. K. k. militär-geografisches Institut, Wien. Sheets: Zone 13, Col. XXVI. Kis-Várda und Vásáros-Namény; 14—XXV. Nyiregyháza und Hajdú-Nánás; 15—XXVI. Nyir-Bélték und Vámos-Pércs; 18—XXV. Nagy Szalonta; 18—XXVI. Tenke und Kardó; 19—XXVI. Ökrös; 28—XI. Selve; 29—XV. Luka und Halapic; 29—XXI. Faković; 30—XII. Sale;

30-XIV. Kistanje und Drniš; 30-XV. Gubin und Vrlika; 30-XVIII. Visoko; 30-XIX. Sarajevo; 31-XIV. Sebenico und Traù; 31-XVIII. Konjica und Pjelečić; 32-XVI. Imoski und Makarska; 32-XVIII. Ulok und Nevesinje; 32-XIX. Jelec und Tjentišta. Price 1s. 4d. each sheet. (*Dulau.*)

Rhein Pfalz.—Neueste, beste und billigste Specialkarte der bayerischen —. Nach den Generalstabskarten gezeichnet 1:250,000 or 3·4 geographical miles to an inch. Kaiserslautern, Gotthold. Price 2s. (*Dulau.*)

Sicilia.—Carta itineraria, fisica e politica della —, costrutta dal Prof. Gambino. Palermo. Scale 1:400,000 or 5·5 geographical miles to an inch. Price 2s. (*Dulau.*)

ORDNANCE SURVEY MAPS.

Publications issued during the month of August 1888.

6-inch—County Maps:—

ENGLAND AND WALES: Anglesey: 3 N.W., 4 S.W., 13 S.E.; 1s. each. Brecknockshire: 9 N.W., 47 S.W.; 1s. each. Cambridgeshire: 47 N.E.; 1s. Cardiganshire: 35 N.E., 36 N.W., 41 N.W., 46 N.W.; 1s. each. Carmarthenshire: 2 N.E., 14 N.W., 31 N.W.; 1s. each. Carnarvonshire: 26 N.E.; 1s. Cornwall: 20 N.E., 26 N.E., 59 S.E., 60 N.W., 63 N.W., S.E., 64 N.W.; 1s. each. Devonshire: 4 S.E., 31 S.W., 54 N.W., S.W., 66 S.E.; 1s. each. Dorsetshire: 48 S.E., 55 N.E., S.E.; 1s. each. Lincolnshire: 46 N.E., 75 S.W., 105 N.W., 168 S.E.; 1s. each. Merionethshire: 19 N.E., S.W.; 1s. each.

25-inch—Parish Maps:—

ENGLAND AND WALES: Brecknockshire: XX. 5, 3s. Cambridgeshire: XXXIV. 16, 3s. Cardiganshire: VI. 3, 3s. Carmarthenshire: XVIII. 15, XIX. 5, 3s. each. Devonshire: XIX. 7, XX. 5, 16, 3s. each; LXV. 1, 4s.; CIX. 9, CXXVII. 7, 3s. each. Dorsetshire: V. 12, IX. 14, XXXIV. 4, 3s. each. Herefordshire: XLIII. 3, XLIV. 1, 3s. each. Huntingdonshire: XXI. 1, 6, 8, 3s. each. Leicestershire: XXXI. 11, 11a. 6d.; XXXII. 14, 3s.; XXXI. 15, 6s. 6d.; XXXVI. 9, 4s. Lincolnshire: LXXIV. 13, 3s.; LXXXII. 4, 4s.; LXXXII. 5, 6, CXLII. 6, CXXXIX. 15, 3s. each. Somersetshire: XIII. 8, 6s.; LXXXIII. 12, LXXXVII. 1, 2, 6, 3s. each.; LXXXVII. 11, 4s. Warwickshire: XVII. 5, 3s. Worcestershire: XXXIII. 7, 6s. 6d.; XL. 5, 6s.

Town Plans—16-foot scale:—

ENGLAND AND WALES: Cambridge, XLVII. 2, 10, 6s. 6d.; XLVII. 2, 2, 9, 26, 8s. each. Taunton, LXX. 8, 21, LXX. 11, 6, LXX. 12, 1, 2, 11, 19, 23, 2s. to 2s. 6d. each.

Miscellaneous Maps:—

Isle of Man: Index Map, scale 1 inch to a mile, 2s. 6d.

Sanitary District Diagrams, showing Boroughs, Union Boundaries, Urban Sanitary Districts, New Counties, &c., 6d. each: Anglesey, Cambridgeshire, Carnarvonshire, Cheshire, Cumberland, Devonshire, Dorsetshire, Durham, Flintshire, Gloucestershire, Hampshire, Herefordshire, Hertfordshire, Leicestershire, Middlesex, Monmouthshire, Norfolk, Northamptonshire, Nottinghamshire, Oxfordshire, Shropshire, Somersetshire, Staffordshire, Suffolk, Surrey, Sussex, Warwickshire, Worcestershire.

(*Stanford, Agent.*)

ASIA.

Indian Government Surveys:—

Railway Map of India, corrected up to January 1888. 32 miles to an inch. 6 sheets.—India, showing districts where cotton is grown. 64 miles to an inch.—India, illustrative of the cultivation of rice. 64 miles to an inch.—Bombay Survey, 1 inch to a mile. Sheet No. 70, District North Gujarát. Season 1885–86. No. 167, Districts Poona and Kolaba, and Hassan and Bhor States. Season 1884–85. No. 275, District Belgaum, Kolhápúr, Sangli and Karundvád States. Season 1885–86.—North-west Provinces Survey. 1 inch to a mile. Sheet No. 211, Districts Ghazipur, Benares, and portion of Shahabad. Seasons 1878 to 80 and 1882–83. No. 218, District Ballia, with overlap of one line of villages across Gogra river in District Sarun of Bengal. Seasons 1875–76 and 1880 to 83. No. 219, Districts Ghazipur and Ballia, with overlap of one line of villages in District Shahabad of Bengal. Seasons 1879 to 1883. No. 220, District Ballia, with overlap in Districts Sarun and Shahabad of Bengal. Seasons 1881 to 83. No. 221, District Ballia, with overlap in Districts Sarun and Shahabad of Bengal. Season 1882–83.—North-west Provinces and Oudh. 1 inch to a mile. Sheet

No. 56a, Parts of Districts Jalaun and of Gwalior and Datia (Native States). Seasons 1853-55 and 1862-63.—Oudh Revenue Survey. 1 inch to a mile. Sheet No. 116, Districts Kheri and Sitapur. Seasons 1864 to 68.—Lower Burma Survey. 1 inch to a mile. Sheet No. 141, District Bassein. Season 1881-82. No. 183, District Henzada. Season 1884-85.—North-western Trans-Frontier. 8 miles to an inch. Sheet No. 3, Part of Persia (Khorasan).—Map of the District of Moradabad, compiled and revised from sheets of the New Revenue Survey. 2 miles to an inch. 2 sheets.—District Burdwan, Lower Provinces, Bengal. 4 miles to an inch. Seasons 1855 to 57.—Jacobabad to Chaman and adjoining country, being an extract from Sheet No. $\frac{21}{2}$ | $\frac{32}{2}$ of the North-western Trans-Frontier Series. 16 miles to an inch. Preliminary edition, 1887.—South-west Asia. Sheet No. 72, Parts of Persia and Turkey.

Nederlandsch Oost-Indië.—Kaart van —. Scale 1:1,800,000 or 24·6 geographical miles to an inch. Naar de nieuwste bronnen bewerkt van E. Geest. Amsterdam, Seyffardt. Price 1l. 2s. (*Dulau.*)

AFRICA AND RED SEA.

Arabischen Meerbusens.—Tiefen-karte des —, entworfen u. gezeichnet von W. Weber. Scale 1:4,000,000 or 55·5 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1888, Tafel 16. Gotha, Justus Perthes. (*Dulau.*)

Witwatersrand Goldfelder.—Karte der —. Reduziert von Troye's Karte von Friedrich Jeppé. Pretoria, Süd-Afrik. Republik, 1888. Scale 1:1,500,000 or 20·4 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1888, Tafel 15. Gotha, Justus Perthes, 1888. (*Dulau.*)

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Department, Admiralty, in July and August 1888.

No.		Inches.	
1168	m	= 12·0	England, west coast:—Towan or New Quay bay, 1s. 6d.
228	m	= 4·0	Arabia, north-east coast:—Khor-al-Hajar, Suadi islands, 1s.
1459	m	= 12·0	China, south-east coast:—Hong Kong harbour, 2s. 6d.
1186	m	= various	Korea:—Goshkevitch bay. Mutine bay. Jubilee anchorage, 1s. 6d.
1193	{ m	= 1·9 }	British New Guinea, south-east coast:—Bira Bira bay. Killerton islands and anchorage, 1s. 6d.
	{ m	= 3·0 }	
1176	m	= various	South Pacific:—Suvaroff island. Lagoon entrance (Suvaroff). Oeno island. Henderson or Elizabeth island. Ducie island. Niue or Savage island, 1s. 6d.
1107	{ m	= 4·3 }	South Pacific Ocean, Society islands:—Otea-vanna harbour. Hurepiti bay. Teoneroa-Haaoa and Hamene bays. Rautoanui pass. Faaroa bay, 1s. 6d.
	{ m	= 1 }	
638	Congo river and adjacent creeks:—Plan added, Banana creek.		
(J. D. Potter, Agent.)			

CHARTS CANCELLED.

No.		Cancelled by	No.
228	Suadi islands	{ New plans, Khor-al-Hajar, Suadi islands	228
1459	Hong Kong road	New plan, Hong Kong harbour ..	1459
526	Otea-vanua harbour, on this sheet	New plan, Otea-vanua, on	1107

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 2675b. English channel:—Middle sheet. 1824a. Ireland:—Eastern sheet. 1-25a. Irish channel:—Northern sheet. 1825b. Irish channel:—Southern sheet. 1179. England, west coast:—Bristol channel. 2682. England, west coast:—Nash point to New Passage. 1170b. England, west coast:—Holyhead to Liverpool, eastern sheet. 1951. England, west coast:—Liverpool bay. 1607. England, east coast:—North Foreland to The Nore. 1610. England, east coast:—North Foreland to Orfordness. 2693. England, east coast:—Orwell and Stour rivers. 109. England, east coast:—Humber river entrance. 1520. Mediterranean:—The Peiræus. 2483. North America, east coast:—Portland harbour. 2831. Gulf of Mexico:—Galveston bay. 828. India, east coast:—Cape Comorin to Cocanada. 833. Bay of Bengal:—Rangoon river and approaches. 216a. Mergui Archipelago:—Lord Loughborough island to Mergui. 626. Japan:—Naka Koshiki and Tatsu Maru, Aburatsu harbour. 134. South Pacific Ocean:—Harbours and anchorages in New Hebrides.

(*J. D. Potter, Agent.*)

North Atlantic Ocean.—Synchronous Weather Charts of the North Atlantic and the adjacent Continents, for every day from 1st August 1882 to 31st August 1883. Published under the authority of the Meteorological Council. Part IV. From 25th May to 3rd September 1883. London, Eyre & Spottiswoode. Price 17s.

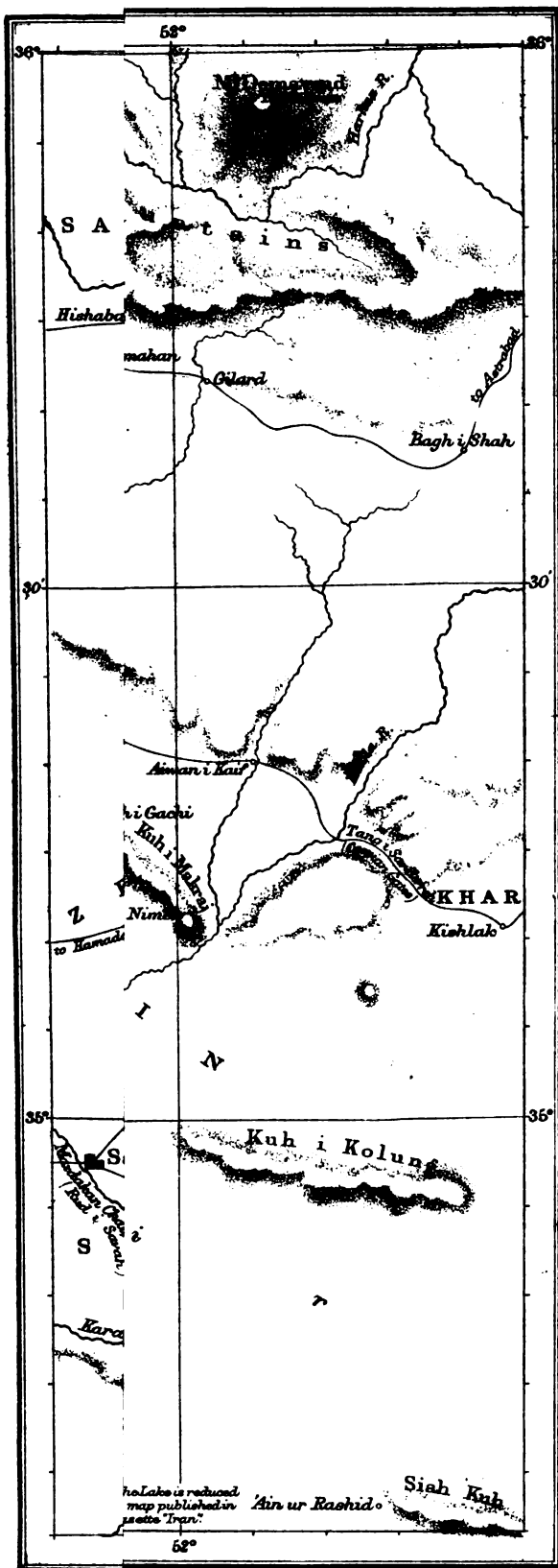
The data on which this excellent series of weather charts are based have been obtained from observations extending over a period of thirteen months, from August 1st, 1882, to August 31st, 1883. In all, 11,236 returns were received by the Department, and as the period embraced was that during which the international system of circumpolar observations was being carried out, data have been obtained from very high northern latitudes, and hence the results embodied are of exceptional value. As this issue in all points resembles those noticed before in the 'Proceedings,' it is unnecessary, in the present instance, to enter into further detail.

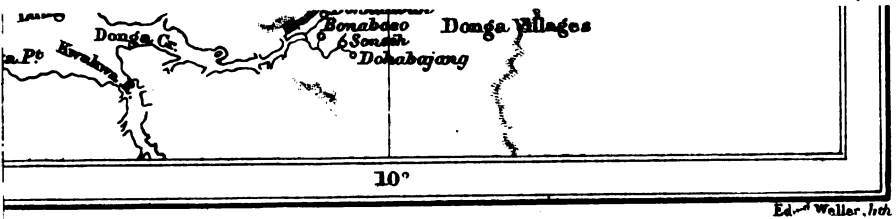
United States Charts.—Pilot Chart of the North Atlantic Ocean, August 1888, with Supplement. Published at the Hydrographic Office, Navy Department, Washington, D.C., G. L. Dyer, Lieutenant U.S.N., Hydrographer to the Bureau of Navigation.

ATLASES.

Volckmar, F.—Atlas Universal para las Escuelas primarias, secundarias y normales. Según los últimos adelantos de la pedagogia alemana, publicado por F. Volckmar. Edición Grande con 38 Mapas, para el Reino de España. Leipzig, F. Volckmar. Hamburgo, L. Friederichsen y Cia., 1888. Price 4s. 6d. (*Dulau.*)

This atlas has been compiled at Leipsic for use in the schools of Spain. In its general features it resembles the same class of atlas in use in Germany, with the exception that more prominence is given to Spanish-speaking countries; indeed the maps of Spain and Portugal, the Argentine Republic, Chili, and Mexico are of a far higher class than those generally to be found in school atlases. The maps, with the exception of those intended to illustrate political geography, are orographically coloured, and the usual physical maps are given.





ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by Colonel H. H. GODWIN-AUSTEN, F.R.S., J. K. LAUGHTON, M.A., and DOUGLAS W. FRESHFIELD, M.A. Contents: Hints on Surveying and Astronomical Observations. John Coles, F.R.A.S.—Meteorology. R. Strachan, F.M.S.—Geology. W. T. Blanford, F.R.S.—Natural History. H. W. Bates, F.R.S.—Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.—Anthropology. E. B. Tylor, D.C.L., F.R.S.—Photography. W. F. Donkin, M.A.—Medical Hints. J. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department.—General Outfit. Colonel J. A. Grant, O.B., Edward Whymper, and others. Price in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, W. and to be had of Edward Stanford, 55, Charing Cross, S.W.

Instruction for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. Surveying and Mapping, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. Geology, including practical training in the field. By Mr. W. Topley, F.R.S., of the Geological Survey. 3. Botany. By Mr. N. E. Brown, of the Herbarium, Kew. 4. Photography. By Mr. John Thomson, Author of 'Photographic Illustrations of China and its People,' and other works.

The lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2s. 6d.

Tickets for the lessons must be previously procured at the Offices of the Society.

Complementary Papers, Vol. II. Part 2.—Now Ready.—CONTENTS:—A Bibliography of Algeria. By Lieut.-Colonel Sir ROBERT LAMBERT PLAYFAIR, K.C.S.G., Consul-General, Algiers.

Fellows who have not applied for the Parts as published, can have Vol. II. by applying at the offices of the Society, 1 Savile Row, W.

LIMMER'S HOTEL,

CONDUIT STREET, W.

This old-established Hotel, situated in the centre of the most fashionable part of London—being mid-way between Bond Street and Regent Street—contains every convenience for the accommodation of FAMILIES and Gentlemen.

The Banqueting Hall is specially adapted for Military and other Dinners, and Wedding Breakfasts.

Address—THE PROPRIETOR.

DR. J. COLLIS BROWNE'S CHLORODYNE

ONLY GENUINE.



ORIGINAL ANT

IS
THE GREAT
SPECIFIC
FOR
CHOLERA,

COUGHS,
COLDS,
ASTHMA,
BRONCHITIS.

DR. J. COLLIS BROWNE'S CHLORODYNE.—Dr. J. C. BROWNE (late Army Medical Staff) DISCOVERED a REMEDY to denote which he coined the word CHLORODYNE. Dr. Browne is the SOLE INVENTOR, and, as the composition of Chlorodyne cannot possibly be discovered by Analysis (organic substances defying elimination), and since the formula has never been published, it is evident that any statement to the effect that a compound is identical with Dr. Browne's Chlorodyne must be false.

This Caution is necessary, as many persons deceive purchasers by false representations.

DR. J. COLLIS BROWNE'S CHLORODYNE.—Vice Chancellor Sir W. PAGE WOOD stated publicly in Court that Dr. J. COLLIS BROWNE was UNDOUBTEDLY the INVENTOR of CHLORODYNE, that the whole story of the defendant Freeman was deliberately untrue, and he regretted to say it had been sworn to.—See *The Times*, July 13th, 1864.

DIARRHŒA, DYSENTERY.
GENERAL BOARD OF HEALTH, London, REPORT that it ACTS as a CHARM, one dose generally sufficient. Dr. GIBBON, Army Medical Staff, Calcutta, states: "2 DOSES COMPLETELY CURED ME OF DIARRHŒA."

From SYMES & Co., Pharmaceutical Chemists, Simla. Jan. 5, 1880.

To J. T. DAVENPORT, London.

DEAR SIR.—We congratulate you upon the widespread reputation this justly-esteemed medicine has earned for itself all over the East. As a remedy of general utility, we much question whether a better is imported, and we shall be glad to hear of its finding a place in every Anglo-Indian home. The other brands, we are happy to say, are now relegated to the native bazaars, and, judging from their sale, we fancy their sojourn there will be but evanescent. We could multiply instances *ad infinitum* of the extraordinary efficacy of **DR. COLLIS BROWNE'S CHLORODYNE** in Diarrhœa and Dysentery, Spasms, Cramps, Neuralgia, the Vomiting of Pregnancy, and as a general sedative, that have occurred under our personal observation during many years. In Choleraic Diarrhœa, and even in the more terrible form of Cholera itself, we have witnessed its surprisingly controlling power.

We have never used any other form of this medicine than Collis Browne's, from a firm conviction that it is decidedly the best, and also from a sense of duty, as we are of opinion that the substitution of any other than Collis Browne's is a deliberate breach of faith on the part of the chemist to prescriber and patient alike.—We are, Sir, faithfully yours, SYMES & CO., Members of the Pharm. Society of Great Britain, His Excellency the Viceroy's Chemists.

DR. J. COLLIS BROWNE'S CHLORODYNE is the TRUE PALLIATIVE in NEURALGIA, GOUT, CANCER, TOOTHACHE, RHEUMATISM.

DR. J. COLLIS BROWNE'S CHLORODYNE is a liquid medicine which assuages PAIN of EVERY KIND, affords a calm, refreshing sleep WITHOUT HEADACHE, and INVIGORATES the nervous system when exhausted.

DR. J. COLLIS BROWNE'S CHLORODYNE rapidly cuts short all attacks of

EPILEPSY, SPASMS, COLIC, PALPITATION, HYSTERIA.

IMPORTANT CAUTION.
The IMMENSE SALE of this REMEDY has given rise to many UNSCRUPULOUS IMITATIONS. Be careful to observe Trade Mark. Of all Chemists. 1s. 1ld., 2s. 9d., and 4s. 6d. SOLE MANUFACTURER, J. T. DAVENPORT, 33, Gt. Russell St., W.O.

VOL. X., No. 11.
New Monthly Series.]

NOVEMBER, 1888.

[To Non Fellows,
PRICE 1s. 6d.]

PROCEEDINGS

OF THE

Royal Geographical Society

AND

Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE		PAGE
THE PEAKS, PASSES, AND GLACIERS OF THE CAUCASUS. By DOUGLAS W. FRESH- FIELD, SEC. R.G.S.	677	OBITUARY	713
METEOROLOGY OF THE RED SEA AND CAPE GUARDAFUI. By General R. STRACHEY, R.E., F.R.S., PRES. R.G.S.	704	PROCEEDINGS OF THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIA- TION. BATH MEETING	717
GEOGRAPHICAL NOTES	708	NEW GEOGRAPHICAL PUBLICATIONS	735
		NEW MAPS	745

CHARTS.

METEOROLOGICAL CHARTS OF THE RED SEA AND CAPE GUARDAFUI	748
---	-----

LONDON: EDWARD STANFORD, 26 & 27, COCKSPUR STREET, CHARING CROSS, S.W.
 PARIS: ANDRÉNEAU-GOUJON.
 VIENNA: ARTARIA & Co.
 HAMBURG: L. FRIEDERICHSEN & Co.
 ST. PETERSBURG: WATKINS & Co.
 MANCHESTER: JOHN HEYWOOD.
 EDINBURGH: DOUGLAS & FOULIS.
 DUBLIN: HODGES, FOSTER & Co.
 BERLIN: D. REIMER.
 LEIPZIG: F. A. BROCKHAUS.
 NEW YORK: SCRIBNER & WELFORD.
 PHILADELPHIA: LIPPINCOTT & Co.
 MELBOURNE: GEORGE ROBERTSON & Co., LIMITED.

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR	"
KURRACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

LIEBIG COMPANY'S EXTRACT OF MEAT

Justus Liebig

*** Ask for the COMPANY'S EXTRACT,
and see that it bears JUSTUS VON LIEBIG'S
SIGNATURE IN BLUE INK across the Label.

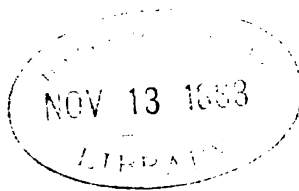
TEETH LIKE PEARLS

Produced by discarding cheap and gritty tooth powders and acid wash
which ruin the enamel, and by using daily

ROWLANDS' ODONTO



A pure, fragrant, and non-gritty Tooth Powder; it whitens the teeth,
prevents decay, and gives a pleasing fragrance to the breath.
Avoid imitations and ask Chemists for ROWLANDS' ODONTO.



PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY

AND MONTHLY RECORD OF GEOGRAPHY.

The Peaks, Passes, and Glaciers of the Caucasus.

By DOUGLAS W. FRESHFIELD, HON. SEC. R.G.S.

WHEN in June last I gave to the readers of this Journal a sketch of Suanetia, I promised to follow it up by a more general outline of the mountains of the Central Caucasus, in so far as we at present know them.

Let us first glance, as rapidly as may be possible, at the elements of Caucasian orography. The truly mountainous part of the chain, from north of Pitzunda to Basardjusi, is over 400 miles long, a distance equal to that between Monte Viso and the Semmering in the Alps. Its skirts stretch out for another 150 and 100 miles respectively to the neighbourhoods of Bakou and Novo Rossisk, the new Black Sea port of Ciscaucasia. It runs from north-west to south-east, between latitudes 45° and 40° N., its centre being in the same parallel with the Pyrenees. The snowy range—"the frosty Caucasus"—which begins north of Pitzunda on the Black Sea, stretches without interruption to the eastern source of the Rion, the ancient Phasis. From the Maruch Pass to the Mamisson Pass—that is, for a distance as great as from Mont Blanc to the St. Gothard—there is no gap under 10,000 feet; no pass that does not traverse glaciers. Continuous no longer, but broken by gorges, one of which is the famous Dariel, the snowy central crest continues eastward, culminating in the glacier groups of Kazbek (16,546 feet) and Schebulos (14,700 feet). East of the historical pass of the Caucasus—the Krestowaja Gora, or Mountain of the Cross—the mountain ridges diverge, enclosing between them the barren limestone plateaus and yawning ravines of Daghestan, "the Highlands," as the name implies. This eastern half of the chain, despite its three glacier groups, Schebulos, Diklos, Basardjusi, I must dismiss in a few sentences. Schebulos, the chief of a cluster of granite peaks which form orographically the continuation of the main chain of the Central Caucasus, has been described by Dr. Radde in his work on the Chevsurs. The range that forms the southern boundary of

No. XI.—Nov. 1888.]

Daghestan, and shelters the rich forests and orchards of Kakhetia, is tame in outline, though high in general elevation, and is said only to become picturesque and interesting in the neighbourhood of the basaltic cliffs of Basardjusi (14,635 feet). This district has also recently been described by Dr. Radde * in 'Petermann's Mittheilungen.' Dr. Radde has been a persistent and energetic traveller in the Caucasus and elsewhere, but he is perhaps even more distinguished as the organiser and curator of the Caucasian Museum at Tiflis. This admirable museum owes everything to the energy, the sympathy with different branches of natural science and human history, and the artistic taste of its founder, who has devoted a lifetime to the formation of a collection which is geographical in the widest sense of the word.

But I must narrow our field of observation to but a small part of the regions that are illustrated in Dr. Radde's museum. We must be content here to concentrate our attention on the part of the Caucasian chain between Elbruz and Kazbek—the Central Caucasus. That portion is 120 miles long—roughly, as long as from Mont Blanc to the Bernina. From Naltshik to Kutais it is 100 miles broad; in its narrowest part about 80 miles broad. A hundred miles is roughly the breadth of the Alps from Grenoble to Turin, Chambery to Ivrea, or Luzern to Arona. Contrary, therefore, to what has often been stated, the Caucasus is slightly, but not very much, narrower than the Alps.

The geological structure of the chain has been represented with general accuracy by M. Ernest Favre,† a son of the well-known Genevese geologist, who visited it in 1868. Kazbek and Elbruz are
 General geological structure. two volcanic excrescences planted close beside the main granitic range.‡ Elbruz has the regular outlines of a typical volcano. Its characteristic peculiarity is that it culminates in two small cones of nearly equal height, separated by a gap some 1500 feet in depth, and 17,000 feet above the sea-level. Each of these cones preserves the features of a crater in a horseshoe ridge broken down on one side, and enclosing a shallow snow-filled basin. Superficial observers from a distance have erroneously conjectured the deep hollow between the peaks to be a gap in an immense terminal crater, a supposition which Mr. Grove's very clear account of his ascent of the western peak ought to have finally set at rest.§

* 'Die Chevs'uren und ihr Land.' Cassel, 1878, and 'Petermann's Mittheilungen,' *Ergänzungsheft* 85.

† 'Récherches Géologiques dans la partie centrale de la chaîne du Caucase.' Geneva, 1875.

‡ The distance of Elbruz from the watershed is reduced by the new survey from 11½ miles to 7 miles. The position of the N.W. peak relatively to the S.E. is also shifted in the new map from N. 41° W., to N. 76° W. The heights of the peaks (given in Russian sagues, equal to 7 feet) are reduced from 18,526 and 18,453 feet to 18,470 and 18,347 feet respectively.

§ Grove's 'Frosty Caucasus,' 1875.

Kazbek has a far less regular outline than its great rival, and the passing traveller who only sees it from the high road may be excused for not recognising its volcanic origin. It appears to be a breached cone (see the figures on p. 123 of Judd's 'Volcanoes'). A great névé now clothes the breach on the northern face of the peak. From this side, if a hut were built on the ridge between the Devdoraki and Tshach glaciers, it would not be more difficult of ascent than Mont Blanc. It was by this route that with my friends Mr. A. W. Moore and Mr. C. Tucker I descended in 1868. M. Lerco, a Piedmontese gentleman who climbed the mountain in 1887,* has sent me a photograph taken on the top of the buttress conspicuous from the post station (about 14,500 feet), which shows the crags that there protrude to be contorted masses of lava.

The backbone of the Caucasus, formed of a system of broken closely parallel ridges, with many short spurs, is from a point considerably west of Sukhum Kaleh to the Mamisson Pass composed in great part of gneiss or granitoid rocks mixed up with crystalline schists. By what seems a strange freak of nature, it is, east of Adai Choch, rent over and over again to its base by gorges, the watershed being transferred to a parallel chain of clay slates—"palæozoic schists" foreign geologists call them—which has followed it from the Black Sea. The how and why of this transfer I must leave to geologists. Its human importance is great. The slates, less steep, less lofty than the granite, are also far less formidable obstacles to traffic. The Krestowaja Gora crosses them at about 8000 feet, the Mamisson Pass slips over the grassy ridge that links them to the granites of Adai Choch at a height of 9200 feet. These are the natural highways from the north to Georgia and Mingrelia respectively. The former has long been the Georgian military high-road; the latter should be opened for wheels this year. They are easy passes—so easy, that it was not on the mountain crest, but where in the gorge of Dariel the granitic range is cleft to its base, that Chosroes and Justinian combined to raise and garrison a frontier fortress between the old civilisations of the world and the legendary hordes of northern barbarism.

To the generalities gleaned from maps and books and scattered observations, the mountaineer adds the rapid and summary impressions gained on the mountain tops. De Saussure and Dr. Tyndall have both claimed a high value for such bird's-eye views as a basis for scientific reasoning. The modern philosopher lays down, however, as a condition of their profitable use, that the observer must be "physically minded." Now, I fear, I am no physicist. Yet possibly an observer may not bring down less of the truth from these Pisgah-heights, because he goes up to them without either a theory to support, or a reputation to endanger. Of thus much I am certain, that even to men not 'physically minded,' panoramas may be most useful in correcting some of the misappre-

* See 'Schweizer Alpenzeitung,' Nos. 17-21, Zürich, 1888.

hensions caused by the conventions of imperfect or uncountoured maps. I shall make bold therefore to call upon my readers to climb with me, in imagination at least, to a height of some 15,000 to 18,000 feet above the sea-level, and while resting on one of the highest crests of the Caucasus, to examine at leisure such a prospect as I saw unrolled before my eyes twenty years ago from Kazbek and Elbruz, last year from Tetnuld and Uku.

The heaven overhead is of a deep gentian blue, the neighbouring peaks are dazzlingly white, as the range recedes the snows shine golden, until on the horizon the farthest crests and the thin streaks of cloud take a rich amber tint, shading off into faint sunrise pinks. A luminous, opalescent, transparent haze spreads over the lowlands, softening, but not hiding their features. About our solitary pinnacle all is still and silent save for the lapping of the little waves of warm air that rise past us from the valleys, the indistinct but perpetual murmur of falling torrents, and the momentary roar of avalanches tumbling from the frozen cliffs of *névé* underfoot into the hidden depths of the glaciers. The vast landscape outspread beneath us is spanned by a broad belt of snowy heights and hollows, as the nightly sky is arched by the Milky Way. These heights do not show as the single wall indicated by maps, but rather as a system of short ridges, running generally at an angle to the direction of the chain, and more nearly due east and west. We distinguish generally two (sometimes more) principal ridges roughly parallel. The peaks are encased in frosty armour, full of subtle lines and delicate flutings,* where the corniced crests throw their lines of shadow on to the tight-drawn breastplate of snow. Below the "*Bergschrund*," or fissure that belts the mountain sides, heavy folds of stainless *névé* fall on to the lower glaciers. Wherever the rocks are bare they show the boldness and rigidity of outline characteristic of the harder crystalline crags. In the central group, round Shkara, Koshtantau, and Dychtau, the forces, whatever they were, that gave the chain its being, seem to have been most strenuously exerted, the crests are higher, the slopes steeper, the trenches deeper. There is a vigour, a violence, one might say, in the mountain structure that recalls the Alps of Dauphiné.†

The hollows between the heights are filled by enormous firths of ice, whose upper basins stretch out parallel to the crests, snowfield beyond snowfield, on a scale hardly found in the Alps except at the base of the Finsteraarhorn. From the "dusky doors" of the glaciers, rivers flash, full-grown, into life, and our eyes follow their course in either direction,

* These are well shown in the view from the Adyr Pass, in this volume.

† I note as a coincidence that I picked up a small bit of rock half crystalline, half black slate, on the Bezingi Glacier, and that Prof. Bonney writes ("*Alpine Journal*," vol. xiv. p. 48), "The crystalline rock in Dauphiné in places is overlain by black slate." The Bezingi Glacier is a geological museum of fragments of crystalline rocks fallen from the neighbouring ranges, as curious to the eyes as obnoxious to the soles of those who tramp up this magnificent ice-stream.

north or south, as they linger for a time in broad forested basins or grassy trenches at the foot of the snows, and gather their tributaries before battling their way out through deep ravines and a maze of foothills to the distant steppe, or the dim waves of the Black Sea. What is the character of the ranges they flow through? Let us examine them more in detail, and first on the north. Here at the base of the central crystalline core of the chain spread broad smooth grassy downs, the pastures of the Tartar and the Ossete. Downs I call them, for the name seems to suit best their rolling outlines, but their ridges attain 9000 to 10,000 feet. They are composed of friable crystalline schists, and of any peaks they ever had, they have long been denuded by atmospheric action.

Beyond these schists rises a broken wall of limestone crowned by pale precipitous battlements (11,000 to 12,000 feet), and cut to the root by breaches, through which flow the mountain torrents.* Beyond, again, lies a broad furrow parallel to the ridges, and then rises the last elevation, a belt of low calcareous hills, on which, here and there among the waves of beech-forest, purple or blue with distance, a white cliff retains its local colour, and shines like a patch of fresh snow. Beyond, once more beyond, spreads the Scythian Steppe; not the waveless plain of Lombardy, but an expanse of long low undulations, which would be reckoned hills in our Home Counties. In their midst rise boldly—resembling in scale and outline, and probably in origin, the Euganean Hills—the Five Mountains of Pätigorsk. Farther east, the basin of Vladikafkaz is enclosed by a semicircle of low hills. They deserve closer inspection, for if not ancient moraines, and I believe they are not, they probably would be found rich in traces of ancient glacier action.

Now let us turn our faces southwards. Here, too, are smooth grassy heights, “crystalline schists,” immediately under the snows, forming the lesser undulations of the three basins, the “Drei Langenhochthäler Imeritiens, Rion, Ingur, and Tsenis-Tskali,” of Dr. Radde. These basins are enclosed on the south by a long high ridge of dark slates, which extends parallel to the crystalline chain from the neighbourhood of Sukhum Kaleh to (at least) the Krestowaja Gora, and attains its greatest height in the snowy domes of the Leila (about 12,500 feet), and the steep pikes of Shoda (11,120 feet), and Sikara (12,550 feet). Behind this slate crest spreads a confused multitude of hills, jurassic and cretaceous, the geological features of which are outlined in M. Favre’s useful map. Their outer edge, distant some 30 to 40 miles from the snows, is marked by a limestone belt, lower and less continuous than that on the north, which frames the gorges of the Rion and rises in the Quamli (6352 feet) and Nakarala (4774 feet) to its most conspicuous

* Those who know Savoy may recognise an arrangement of rocks similar, though on a larger scale, to that found round Mont Blanc, in the granitoid rock of the Aiguilles, the schistose downs of Mégève, and the limestone cliffs of the Aiguille de Varennes and Pointe Percée overshadowing the ravine of the Arve.

elevations. At the foot of the latter lie the coal-mines of Khibouli, recently connected with Kutais by a railway. Over its high uplands spreads one of the noblest beech forests in the world, varied by a natural undergrowth of azaleas, laurels, box, and rhododendrons, such as we try to reproduce in our English parks.

What ideas or suggestions may we derive from such a landscape! Great panoramas, Caucasian or Alpine, suggest in my mind that the agency that first created the mountains was crumpling by pressure. That the original irregularity of surface so produced took the form of a gigantic smooth-sided bank or mound appears to me incredible. I seem to see in the mountain structure a series of primary parallel ridges and furrows, enormously modified, no doubt, by subsequent exertions of forces similar to that which made the chain and by subaerial denudation in all its forms, but still roughly recognisable. There are no doubt difficulties enough in the way of a theory that will explain everything! How shall we account for occasional transverse ridges, for the great clefts that split the crystalline rocks of the central chain to their base in the Dariel and Alagyr gorges? Did they sever only the limestone crest there might be a choice of hypotheses. They might have been sawn out by water following its old channels through a slowly rising ridge of later elevation. But to account for the crystalline gorges we require the exertion of some force similar in character to that which raised the chain, but acting at right angles to it.

Internal forces have produced the rough-hewn block. But other agencies have been at work to model the noble forms we see around us: heat and cold, moisture and torrent have, century after century, split the mountain crests and furrowed their flanks. Ice moving backwards and forwards along the hollows has polished and smoothed their sides, leaving behind it as it retired immense loads of the broken soil it had carried down from the higher ranges. These agents have done an enormous work, but they have been sculptors and polishers, not quarriers, and their share of work even as sculptors has been, perhaps, exaggerated. Like Michel Angelo in his colossal statue of David, they have had to follow the form of their material. Weather and water are sharp tools; ice (as an excavator) is nature's substitute for sandpaper, and a fairly efficient one. But to attribute to them alone the conformation of mountain ranges is surely excessive. Erosionists seem to me to win for themselves sometimes an apparent victory by the familiar device of setting up a man of straw—the fracture or fissure theory—as their opponent. Within the limits in which I have invoked it, that theory seems tenable, and it is indeed admitted to be so by Dr. Tyndall himself.* But when stretched to account for all the broader undulations of hill regions it becomes, I agree, absurd. Dr. Tyndall, I think, evades the real strength of the position of those who believe in other causes besides erosion, when he

* See 'Hours of Exercise in the Alps,' 1864.

complains that he has met with "no precise statement how the forces which produced upheaval acted." Such a statement was given by Mr. John Ball in 'Philosophical Transactions' for 1863, when he stated that the forces employed would naturally lead to "the formation of parallel ridges with intermediate depressions."* May not an observer of glaciers obtain some hints as to mountain structure from what he sees in the ice of the behaviour of an imperfectly elastic body under pressure? The surface of the ice and its water channels are finally modelled by exposure to air and water action, but the broader elevations and depressions are the result of other agencies.

Let us now for a moment spread out on the crags before us the five-verst map and compare its presentment with nature herself. So far as physical features are concerned, the most remarkable merit of the map lies in the accurate distinction made between the bare and forested districts. Its most patent inaccuracy is the great reduction of the area occupied by snow and ice. But perhaps the most striking and significant contrast between the map and nature is in a matter in which the map-makers are nowise in fault. In the landscape the leading outlines of mountain architecture do not follow the waterpartings. Often, as at the sources of the Ingur and the Rion, the ridges which divide the river basins have none of the importance naturally attributed to them by a student of maps.

Again we are disposed perhaps, looking at the map, to fancy that the great spur of Dychtau and Koshtantau runs at right angles to the axis of the chain. Now we see that it is in fact rather a parallel ridge separated from the watershed by a deep gap—the Shkara Pass of Mr. Mummery. A horseshoe, of which the two limbs are parallel to the axis of the chain, would express perhaps more closely the relations of this spur—the crest encircling the Mishirgi Glacier—to the rampart that divides the icefields of Bezingi from the downs of Suanetia. And this elevation appears to be connected with the line of granitic peaks north of the Uruch.

I have done my best to set out clearly and shortly what I know—something perhaps more than is yet known—of the structure of the Central Caucasus. I have even attempted—at the risk of being held presumptuous—to give my reading of its physical history. But I shall best express my own feelings if I conclude this humble attempt in the words of the eminent mountaineer and cautious investigator who first set us an example in exploring the world above the snow-line.

"When I was young," wrote De Saussure, "and had crossed the Alps several times, I thought I had seized the facts and general relations of

* I wrote out the notes on which this argument is founded before I had seen Mr. Ball's article. Any coincidences of thought and language that may be found here are therefore accidental. I have not thought the fact that I have unconsciously followed in some points such a far more competent observer a reason for suppressing my conclusions, but rather the contrary.

their structure. I once delivered a lecture, in which I set forth the result of my observations. But since, by frequent travel in different parts of the Alps, I have increased the number of my observations, I have almost come to the conclusion that there is nothing in the Alps so constant as their infinite variety."

To those readers who already know something about the Caucasus, much of what I have so far said may seem familiar. They may be beginning to ask by what new information I propose to prove Errors to be eradicated. my title to trespass on their attention.

I desire to clear away once for all the erroneous representations of the glacier region of the Caucasus, of the structure of the main chain, of the disposition of its peaks, which are still sometimes promulgated in geographical works deservedly of the highest authority. I desire to replace some current fiction by the nobler and more interesting reality.

Let us examine for a moment the exact nature and origin of the errors we shall be called on to correct.

In 1868, the year of my first visit to the Caucasus, a young geologist, M. Ernest Favre, travelled, as I have already had occasion to mention, in the Caucasus, and on his return published a small volume and a geological map. M. Favre did wonders in the time at his disposal. His map was a great addition to our knowledge, his geological and orographical observations were most valuable—so far as they went. But not being a mountaineer himself, and having no icecraft at his command, the glacier region necessarily remained as much a *mare clausum* to him as the Palæocrystic Sea is to the British Navy.

Consequently, he had to go for his ideas of it to the 5-verst-to-the-inch Russian map, published between 1847 and 1863 under the superintendence of General Chodzko. Now the surveyors did their work admirably as far as their means and their instructions carried them.

The Russian Survey in-correct above the snow-line.

They laid down with surprising accuracy and completeness all the ground below the snow-level, and outside the inner recesses of the range. They produced an excellent delineation of the habitable country and the practicable horsepaths. They were employed for military and administrative purposes, and not for scientific research. To have delayed issuing their map until they had made it physically complete would have been impossible.*

* There is in the R.G.S. Library a curious tract issued in 1863 by General Chodzko, the head of the survey, giving some account of his twenty-five years' labours. Sometimes his officers worked under the fire of hostile villagers. Nor were they less brave in facing natural difficulties, so far as their means availed them. The General camped for several days on the top of Ararat, he climbed Zilga Choch, a peak of 12,600 feet on the watershed south of Kazbek, in order to connect his Ciscaucasian and Georgian stations. More than this without icecraft he could not do. It is curious that none of the great peaks of the Dariel were triangulated from stations south of the chain. This is the reason why the mountains on the watershed, including the great Ushba, escaped notice. They are invisible, or inconspicuous, from the northern steppe.

Accordingly, they were content to fix trigonometrically, mostly if not altogether from the northern side, the heights and positions of a few prominent peaks. The snowy fastnesses were in most cases represented by conventional signs; a blue smear here and there served as an indication of glaciers, and above the snow-level a number of brown ridges were laid down without much care as to their correspondence with nature. In doing this the surveyors followed the precedent of all the first staff maps of the Alps except the Swiss.

I venture to think that it might be better in all such cases if the part imperfectly surveyed were either left blank, or distinguished in some striking manner. For the public, or rather its teachers, accept naturally a map as equally authoritative in every part. That most intelligent traveller M. Favre, finding that the surveyors, so far as he has gone, indicate accurately every considerable wood, every pool as big as the Hampstead ponds, very readily accepts the picture given of the glacier region of the great chain, to which he has not himself penetrated.

The next step follows almost as a matter of course. The encyclopædist of geography, the man to whom our science owes perhaps more than to any living writer, M. Reclus, naturally takes his information as to the Caucasian glaciers with most confidence from a geologist of standing. The passage below, copied almost word for word from M. E. Favre, occurs in M. Reclus' monumental '*Géographie Universelle*': *—

"Although with a greater mean elevation than those of the Alps, the Caucasian peaks are far less covered with snow and ice, not only in consequence of their more southerly latitude and other climatic conditions, but also owing to the narrowness of the upper crests and the absence of cirques where the accumulated snows might serve as reservoirs of glaciers. . . . The absence of snow produces a corresponding scarcity of glaciers."

And then M. Reclus gives as physical maps illustrative of his statements extracts from the survey of Kasbek, Elbruz, and the chain north of Suanetia, which are entirely false to nature, and are proved to be so not only by the perambulations of mountaineers, but by the more recent surveys now in progress.

In these quotations I must traverse, one by one, both the conclusion and the premisses—sparing only the latitude. The other climatic conditions are favourable to glaciers, that is, the snowfall in the Central Caucasus is heavier than in the Central Alps, the crest is broad and has a number of high spurs, which enclose many well-filled glacier reservoirs.

In the '*Journal of the Geological Society*' for 1874 I find a traveller throwing doubt on the extent of Caucasian ice-fields, on the strength of his own experience. His evidence is invalidated by the fact, made clear

* Vol. vi. p. 40, of the English translation.

by his description of the view of Kazbek from the post-station, that he did not know a glacier when he saw one!

Again, take up the most recent and authoritative work on glaciers by Prof. Heim of Zurich. Prof. Heim's estimate of the surface covered by ice is enormously under the mark. We find the author stating that there are only 120 square kilomètres of glacier in the whole Caucasus, of which sixty are on Elbruz. The Aletsch Glacier in the Alps alone covers 129 square kilomètres, without reckoning its two principal tributaries.*

Such being the present condition of scientific knowledge (outside the Alpine Club) concerning the Caucasus, it is obviously expedient to emphasise in this Journal the facts learnt in the last twenty years by mountain climbers. During this period Elbruz, Kazbek, Koshtantau, Shkara, Djanga, Tetnuld, Gestola, Ushba, Adai Choch, Uku, Dongusorun, and various other peaks varying from 18,500 to 11,100 feet, have been climbed, some twenty glacier passes of over ten thousand feet have been crossed. The expeditions have been made by travellers of Alpine experience, capable therefore of appreciating and describing by reference to a well-known standard what they have seen.

I have myself climbed six Caucasian summits, and crossed the main chain by five snow-passes, as well as traversed many secondary ridges. My last year's companion, M. de Déchy, has ascended Elbruz and Adai Choch, and spent four summers in the Caucasus, photographing and taking heights wherever he has been. In 1886, my friends, Mr. Dent, the President of the Alpine Club, and Mr. Donkin, its Secretary (to whom we owe so many magnificent photographs of the High Alps and their glacial phenomena), visited the central group, mapped one of its chief glacier basins, and climbed one of its loftier peaks. Last July Mr. Mummery ascended Koshtantau and explored the heads of the Dychnsu and Thuber-Basilsu Glaciers.

Later in the year, in the month of August, a party consisting of Mr. H. W. Holder, Mr. J. G. Cockin, and Mr. Hermann Woolley, with two Alpine guides, climbed Koshtantau by the northern ridge (a different route to Mr. Mummery's), my "Saddle Peak," for which they obtained the name of Kartantau, Sallananchera, the crest (unnamed in my map) north of the Zanner Pass, and the pass between the Dychnsu and Bezingi Glaciers. They failed in an attempt to reach Mishirgi Tau. Mr. Cockin and the two guides remained behind, and were rewarded by the conquest of Shkara, Djanga, and Ushba itself!

About the same time Mr. C. T. Dent, Mr. W. F. Donkin, and Mr. H. Fox, with two guides, crossed the Leila chain into Suanetia, whence

* See 'Alpine Journal,' vol. xii., for a careful analysis of Professor Heim's work, by Mr. F. F. Tuckett; and an article by myself dealing at length with various inaccuracies in other authors concerning the Caucasus and my own share in its exploration.

Mr. Dent was obliged by ill health to return. His friends examined Ushba, and crossed the Betsho Pass to Uruspieh, ascending Dongusorun on the way. Thence they found an interesting new route—"a splendid pass" Mr. Donkin writes—to Chegem and Bezingi. They left that village on August 25th. On the 29th they left their camp in the Doumala Valley with their Alpine guides, intending to cross the glaciers of Dychtau to Karaoul in the Balkar district, at the head-waters of the Cherek, where their interpreter was instructed to expect them on the 30th or 31st.* They have not been seen since. Elsewhere† I have written what I can concerning this terrible and as yet obscure catastrophe, which has cast a shadow that can never be removed—in some eyes—on the snows of the Caucasus, which has caused sorrow not to be dwelt on here.

But it is not impossible that a cautious reader may, like M. Reclus, hesitate to prefer the reports of "mere climbers" to the results of an official survey confirmed to some extent by travelling "scientists." I hasten therefore to add that many of the most important statements I make have received, and that others are in process of receiving, the confirmation of trained surveyors. The Russian staff, imitating in this respect the French, the Italian, and the Austrian in the Alps, have recognised the incompleteness of their first work, and are even now employed on its correction. The Kazbek group has been laid down in a new staff survey lately completed, which, as to the glacier system, completely contradicts and supersedes the old map. Elbruz also is in process of being re-mapped, and the first sheet of the new survey, showing the sources of the Baksan, demonstrates the entire incorrectness, first pointed out in detail by M. de Déchy,‡ of the 5-verst map in this quarter. A rapid re-survey of the great central group is in progress, and the result is to be given to the public in 1889. Doubtless in ten to twenty years (the task is not a light one) the snowy chain will be represented with scientific accuracy by trained surveyors.

Meanwhile, the sketch-map, shown to the Society last winter, though in some parts it had no pretensions to scientific accuracy, gave a roughly truthful representation of the heart of the Caucasus. It indicates the complex character of the snowy chain, its numerous spurs, how the glacier basins are disposed, how the ridges encircle and divide them. All the mountains east of the Mamisson Pass are laid down from the new maps sent me by General Shdanov. Mr. Donkin has, by means of numerous magnetic bearings and photographs, depicted with considerable accuracy the great Bezingi Glacier. M. de Déchy has provided me

* These names will be found in the map attached to the June 'Proceedings.' A woodcut in the 'Alpine Journal' of August last (No. 101) shows the Doumala Glacier and the gap under Dychtau leading towards Karaoul.

† See Obituary Notices in the present No. of the 'Proceedings.'

‡ See 'La Svanétie Libre,' Budapesth, 1886.

with a mass of photographs. For the rest I have had materials in bearings, and sketches of my own taken from many lofty standpoints. Thirty-six pages of topographical notes are embodied in that sheet. By a comparison of these materials, something has been produced, imperfect from any standpoint, valueless doubtless from a rigid mathematical standpoint, but which yet can hardly fail to correct some false conceptions, and by its very shortcomings ought to stimulate others with more means, time, and training at their disposal to carry on the work of Caucasian exploration.*

I now turn to particulars; and first as to heights.† The surveyors in the first instance triangulated only the snowy peaks visible from the northern steppe. Between the Maruch Pass and the Mamisson Pass they measured no peak on the watershed, except, possibly, Adai Choch (15,241 feet). The only peaks of the central group measured were Koshtantau and Dychtau, 17,096 and 16,925 feet respectively, both standing on a northern spur. This spur (well shown in my sketch from Pätigorsk, reproduced by Reclus) acts as a gigantic screen, concealing from the observer on the north a line of equally lofty summits. It is as if some early Alpine explorers had measured the Mischabel and Weisshorn, and overlooked Monte Rosa.

But the heights thus ascertained must be received until they are altered by the same authority. The heights given to the peaks of Elbruz in the 5-verst-map—18,526 feet and 18,453 feet—have been often tampered with. One man of science must needs strike a mean between the height of the two peaks; another makes a mistake of 300 feet in turning mètres into feet, and so confusion has been brought in.‡ The new survey of the Baksan gives the heights of the two peaks (in Russian sagues) as 18,470 and 18,347 feet respectively. Is it possible that these figures represent the highest rocks visible from that valley? The culminating crags face towards the Malka. Again, let me beg geographers to believe the climbers of Elbruz; the hollow between the peaks is not a crater, as I have seen it stated to be; each of the peaks is a separate and distinct crater.

North of Suanetia, and in the main chain, the survey has recently found figures for the broad bulk of Dongusorun (14,600 feet), the Breithorn of the Caucasus, conspicuous, like its Swiss rival, from the

* The map will be further corrected by the insertion of the results of the journeys of the past summer as far as they are obtainable.

† It is proper that surveyors should give the precise mean of their measurements. But it must not be supposed because one peak is measured as 12,876 feet, another as 12,879·5 feet, that these figures represent a constant difference. The height of a snow-peak may differ from year to year up to 20 or 30 feet according to the season. Not a single snow-peak in Tyrol, has, I believe, come out exactly the same height in the present survey and in that made fifteen years ago.

‡ See the English Reclus, vol. vi. p. 36, where wrong heights are given for all the great peaks.

valley at its northern base—the Baksan. The towers of Ushba are still unmeasured, but may be estimated at between 15,500 and 16,000 feet.* Between them and the heights of the central group lies a maze of peaks and glaciers, where the highest summits range from 13,000 to 14,500 feet.

We next come to the central group, the true heart of the Caucasus. *Shkara*, the Monte Rosa of the chain, probably also its second summit, I must now formally introduce to geographers and mountain-lovers, to whom it has hitherto been unknown, or known only under a false name. Like Monte Rosa, it falls to the low ridges and forested dales of the south in gigantic tiers of frosty precipices; like Monte Rosa too, it culminates in a many-crested ridge conspicuous from the southern plains and even from the seaboard as far as Batoum. *Shkara* has not yet been accurately measured.

For its erroneous identification with Koshtantau, I am myself primarily responsible. When, twenty years ago, we got from the Stulevesk Pass a panorama of the eastern side of the central group, we saw a mountain apparently higher than that occupying the place assigned on the map to the highest measured peak, Koshtantau. Here was a dilemma. Either the second peak of the Caucasus was unmeasured, or it was misplaced a mile or so. We mistakenly adopted the second explanation—that it was misplaced. In fact the Russian surveyors had measured the peak on the northern spur and had not measured *Shkara*. Consequently the Koshtantau of my book (except in the panorama from Pätigorsk, reproduced by Reclus), of Mr. Grove's 'Frosty Caucasus,' and of Mr. Dent's recent articles in the 'Alpine Journal' is *Shkara*. A rough observation made with the aid of maps and photographs confirms our first impression that *Shkara* is higher than the Unknown Peak, as we called it, which has proved to be the Koshtantau of the map.† Mr. Mummery, who first climbed Koshtantau, also gives the palm to *Shkara*.

Next, in addition to *Shkara* we must picture along the crest that overhangs Suanetia three more summits, the broad-topped *Djanga*, a saddle-like crest (*Kartantau*?), the cone of *Gestola*, and opposite the last, on a short southern spur, the peak M. Favre calls "the gigantic pyramid of Tetnuld," a peak resembling in form the *Weisshorn*, of which I had the pleasure of making the first ascent last year. All these great peaks are between 16,000 and 17,000 feet high—higher than Mont Blanc. Their exact inches we shall know before long. Meanwhile this glorious

* In this estimate I take into account a note, the last, I received from Mr. W. F. Donkin.

† 17,278 feet is the height we obtain for *Shkara*. There is unluckily a further difficulty in nomenclature: the natives call the *Dychtau* of the five-verst-map, *Kosh-tantau*, and the *Koshantau*, *Dychtau*. I have not ventured to correct an error so long established. Possibly the new surveyors may revert to local usage. If they should, there will be for a time constant confusions and mistakes.

cathedral of nature may be described, or rather its glories may be suggested, though we are still without the precise dimensions of its individual members.

The second great glacier group—*Knotenpunkt*, a German might well call it—on the watershed is that known as the Adai Choch group. One of its highest peaks, the most conspicuous from the south, has been ascended by M. de Déchy. The highest triangulated point (the identity of which with the peak seen from the Rion, and climbed by Déchy, I consider more than doubtful) is 15,241 feet. The bold snowy tower of Bordjula, conspicuous from the south, has been recently found by the Survey to reach 14,083 feet. The main group consists of half-a-dozen peaks of about 15,000 feet standing round the enormous névé basins of the Karagam, Skatykom, and Ceja glaciers, all draining towards the northern valleys. Considerable glaciers on its southern flanks feed the sources of the Rion.

I must also call attention to what I hold to be really part of the central chain, the geological continuation of the Dychtau-Koshtantau ridge, the snowy range north of the Uruch. Three of its fine rock-peaks reach 14,678, 14,729, and 14,408 feet respectively. The first, the Giuliuch of the map, is figured in my 'Central Caucasus' (p. 411). Had the trough of the Uruch been less deep there might have been here another great longitudinal glacier like the Bezingi and the Dychnau.

Of these peaks, Elbruz has been ascended four times, in 1868 and 1874 by Englishmen, in 1884 by M. de Déchy,* last summer (according to the newspapers) by Baron Ungern Sternberg. Three parties at least, including the well-known Siberian explorer M. Ivanoff, have failed on it. Kazbek was climbed by myself and my friends in 1868, and never again (despite numerous statements to the contrary) until 1887, when M. Lerco, a Piedmontese gentleman, with an Alpine guide, writes me he reached the summit. Koshtantau, Tetnuld, Kartantau, Gestola, Dongusorun, Adai Choch, Shkara, and Ushba are the other great peaks that have been climbed.†

I turn to the passes, confining my view for the present to those over the main chain. From the upper Ingur—Suanetia—there are many ways over the glaciers to the northern valleys known to the natives, and two or three in present use.

The westernmost, the *Djiper Pass*, 10,900 feet, leads from the sources of the Baksan to the Neskra glen. It is too round-about, and involves also the crossing of a second high pass (10,400 feet), for travellers to Suanetia. It was formerly a route to Sukhum Kaleh, but

* 'Annuaire du Club Alpin Français,' vol. xi.

† The name Tau is generally given to a range and the passes over it by the Tartars north of the chain. Beyond their country it is inappropriate. A similar word *Tauern* is used in the same double sense in Central Tyrol. It is said that some of the ornaments dug up in the Caucasian graveyards are only duplicated in the Tyrolese excavations! I mention the coincidences for what they are worth.

is now, owing to the depopulation of Abkhasia and the decay of the forest-paths south of the chain, hardly used except by hunters. M. de Déchy and an English sportsman, Mr. Littledale, have been over it.* It is easy for mountaineers on foot.

The *Dongusorun Pass*, 10,850 feet, is the easiest of all the passes in this part of the chain. I crossed it in 1868; Professor Kovalevsky has ridden over it. Baggage animals can in some seasons be got over. It resembles in the extent and character of the glacier traversed the St. Théodul. It leads from the source of the Baksan through the Nakra glen to the lowest villages in Suanetia.†

The *Betsho Pass*, 11,692 feet, leading directly from Betsho to the Upper Baksan, is, according to Alpine ideas, a great but easy glacier pass. M. de Déchy has compared it to the Alphubel. The glaciers on both sides of it are extensive and crevassed. A sotnia of Cossacks crossed it in 1875, taking with them the officers' horses, but losing all except one. Two donkeys with some of our goods got safely across last summer. An Italian traveller, M. Lerco, who has since crossed it, assures me that they must have been "miraculous" donkeys. The mountaineering powers of all the animals in the Caucasus, from horses down to sheep, are far in excess of those of Alpine beasts. I have seen a flock of sheep leap a "Bergschrund."

The next four passes, one between the Betsho Pass and Ushba, descending into the Shichildi valley, a tributary of the Baksan; the *Adyl*, leading from the valley of that name to the Mestia Glacier; the *Gorvatsch*, and the *Adyr*, leading from the Adyl Su to the same glacier on the south side, are abandoned by the people of the country. Only the last has been crossed as yet by travellers. They are exceedingly laborious glacier passes of the character of the Strahleck or the Lysjoch, between 11,500 and 12,500 feet in height. Their *raison d'être* has disappeared with the pacification of Suanetia. So long as each community in Suanetia was at war with its neighbours it was highly inconvenient to arrive in the wrong one! Consequently, a more difficult pass would be faced if it brought the traveller exactly to his friends or customers. Sometimes another expedient was resorted to, and a high second pass over a minor ridge crossed. In this way I explain one of the most curious eccentricities of the 5-verst map. The surveyors lay down a track up the most unmanageable icefall in the Caucasus, that of the Adish Glacier. No doubt the Adishers in old times reached the southern foot of the Zanner Pass by the ridge behind their village and the Tetnuld Glacier without descending to the Mujalaliz. The track on the map was probably inserted from some half-understood evidence to the effect that there was a way over the chain to Bezingi.

The passes above referred to all lead to the Baksan. There is a pass

* 'La Svanétie Libre.' 'Bulletin de la Société de Géographie Hongroise,' 1886.

† See my 'Central Caucasus,' London, 1869.

from the head of the Gvalda Glacier, the basin of which is of enormous extent, to the Basil Su, the western branch of the Chegem valley. Two—the *Basil Pass*, a variation of which was crossed last summer by Mr. Mummery,* and the *Thuber Pass*, 11,815 feet—lead from Mujal over the Thuber Glacier to Chegem. The Thuber Pass is well known, and though traversing great glaciers, is crossed from time to time by Suanetians seeking employment in the north.†

The only pass leading from Suanetia directly to Bezingi is the *Zanner*. This, like the western passes, had fallen into complete disuse for a quarter of a century when we reopened it in 1887. It is very long, very high (over 13,000 feet), but not difficult as Alpine climbers reckon difficulty.‡

The formidable cliffs of the central group now bar all passage, except possibly to trained icemen, up to the extreme source of the Ingur. From the sources of the Skenis Skali, the crest can be easily reached from the south. A pass was used in old times here by the Ushkul people who wanted to go to Balkar. The ascent is from the glen of the Zeskhu and the descent on to the large glacier lying east of the Dyohsu Glacier on the northern slope. It is marked on the 5-verst map as the *Gezivesk*. This pass is now abandoned in favour of the *Pasi Mta* (11,400 feet, Grove), the col at the source of the Phasis or Rion, of which it appears to preserve the ancient name.§ There are two passes here side by side, like the Old and New Weisssthor; the eastern, the *Edenis Mta*, has been abandoned in consequence of changes in the glacier. The *Pasi Mta* is an interesting pass, for it is an ancient and well-established line of traffic. The men of Gebi, the chief village on the south side, are pedlars, and cross with goods to the north; from the north come the Tartars of Karatchai, a keen race of herdsmen and horse-breeders. It is a week's journey from their villages, west of Elbruz, to Gebi. "How many horses have you brought over?" I asked of one last autumn. "Sto"—a hundred—was the reply. Gebi has a prosperous air. Its women wear a most picturesque costume—two robes of different shades of red. A long white scarf, confined round the head by a gay turban, hangs down the back. The neck is adorned with long rows of sea-shells or amber beads. I regret that I did not acquire one, for I have since learnt that in the tombs excavated at Styr-digor, in the Ossete country, just north of the chain, similar necklaces have been dug up; and the shells are said to be of kinds found only in the Indian Ocean, while the amber of course points to a northern trade. The people of Gebi have some curious customs interpolated in

* See 'Proc. R.G.S.' for September last.

† See Déchy's 'La Svanétie Libre.'

‡ See 'Proc. R. G. S.' for June last, and 'Alpine Journal,' No. 101. The Adine Pass, a mile perhaps farther south, is a variation, as the Finsteraarjoch is a variation to the Strahleck. It was crossed this year by Mr. Mummery.

§ See Grove's 'Frosty Caucasus,' London, 1875.



W. F. Donkin, phot. 1886.

TETNULD,
FROM THE WESTERN SHOULDER OF GESTOLA.

their church ceremonies. Thus I saw an ox slaughtered and cut up in the churchyard—a parish officer apportioning to each house its plateful. Earlier in the day the children of each family had brought offerings—a sweet cake, some fruit—to be blessed.

Beyond these come two more glacier passes, the *Gebivesk* and *Gurdzivesk*, leading from the upper Rion to the Ossetes of Styr Digor, on the Uruch. Horses are occasionally forced over them, but it is a risky business. They may be compared to the Col d'Hérens. Their height is about 11,200 feet.*

Between these and the Mamisson Pass there is no pass known in the country. In 1868 I forced a passage over the watershed at the head of the enormous Karagam Glacier, 12,250 feet (which descends lower than any other ice-stream on the north side of the Caucasus), between Bordjula and the great cluster of peaks known as the Adai Choch group.

Beyond the Mamisson a number of horse-passes lead across the watershed, which here, owing to its transference to the slate range, loses both its height and glaciated character, and consequently its importance as a political and tribal barrier. The Ossetes dwell equally on both sides of the chain, a fact of high historical importance.†

The glaciers of the main chain are many, and some of them are enormous. Among those that have the largest basins, I may mention between the Djiper Pass and the Mamisson on the south side, the Josinghi, the Ushba, the Gvalda, the Thuber, the Zanner, the Tetnuld, and Adish, all in Suanetia, the Sopchetura at the western and another at the eastern source of the Rion. On the north side there is a great glacier in every glen; the Karagam and the Bezingi are probably the largest, next come the Dychsu, the Basil, the Zea, the Adyr and Adyl, the Mishirgi, and a host of others lying not only on the main chain, but on its spurs, which are glaciated to an extent of which the

* See Freshfield's 'Central Caucasus,' and Klaproth's 'Voyage au Caucase.' Dubois de Montpereux points out that Klaproth did not himself traverse these passes, but borrowed his description from a Russian officer.

† The passes across the Leila range into Suanetia from the south are catalogued by M. Iljin in Petermann's 'Mittheilungen,' vol. xxx. A pass east of the Latpari, leading directly to Ushkul, should be added. The Lyassil or Latal Pass was crossed last summer by an English party, who found it much longer than M. Iljin's note led them to expect. There is a long high range covered with snow and ice stretching west from the Leila towards the Ingur. Lying south of a tributary valley, it is partly hidden by a minor ridge and seen only from a certain height in Suanetia.

I suggested in my previous article that Sir John Mandeville's description of the Land of Darkness might apply to Suanetia. El Masudi mentions a region in the Caucasus in terms which may well be based on the natural peculiarities of the upper Ingur valley. It is enclosed "by a wall raised from below upwards, two miles high and fifty miles in circumference. These rocks render it impossible to go within the enclosure. By night you see many lights in it in different places, and by day you discover villages, cultivated grounds, rivers which water those villages, men and cattle, but everything appears little on account of the height from which you look down. Nobody knows what nation they are, for they are unable to climb up, and no one who ascends to the top can go down to them."—Sprenger's Translation, vol. i.

No. XI.—Nov. 1888.]

3 A

Ordnance map gives no hint. On the slate range south of Suanetia, which rises to over 12,000 feet, there are glaciers hardly if at all inferior to those of the Grand Paradis group south of the valley of Aosta.

Owing to the deficiencies of the Survey, the lengths of the Caucasian glaciers cannot as yet be stated with the same accuracy as those of the Swiss. The Karagam glacier in the Adai Choch group is, I believe, the largest (10 to 12 miles), the Bezingi and Gvalda glaciers are about 9 to 10 miles in length; the Zanner, Thuber, Dychnu, Zea, south-eastern glacier of Elbruz, and probably others over seven miles. In the Alps the Aletsch Glacier reaches to $15\frac{1}{2}$ miles, but no other exceeds nine. Putting aside the Aletsch, which owes its immense size to the accidental combination of a wide basin and a long high-level trough (I do not believe that large glaciers make deep troughs, but that shallow troughs help to make long glaciers), the largest Caucasian ice-streams are slightly longer than the largest Alpine ice-streams, and there are, I believe, considerably more glaciers over five miles long—it is a little early to commit oneself to a precise estimate of the proportion—in the Caucasus than in the Alps. The terminations of the Caucasian glaciers are naturally, considering the latitude, higher than the Swiss. The Karagam glacier, 5700 feet, is the lowest on the north side; on the south side the Ushba and Gvalda glaciers united under 6000 feet a few years ago, and are now two to three hundred feet higher. The majority of the great glaciers lie north of the watershed; the point to which they descend would appear to be regulated much more by the size of their *névés* and other accidents, than by their exposure, for instance the Zanner and Bezingi glaciers both terminate between 6800 and 7000 feet.

Let us dismiss for ever the preposterous fiction about the 120 square kilomètres of ice in the Caucasus. It is too soon to say how many square kilomètres there really are. One estimate quoted by Von Thielmann,* would make the extent covered by ice close upon 2000 square kilomètres, or equal to that in Switzerland—political Switzerland—not the Alps. But let us avoid the snare of hasty generalisation founded on inadequate material. Until the chain has been scientifically mapped, no accurate result is possible.

Comparisons are often the simplest and most effective form of description. I shall assume some knowledge of the Alps in my readers. Let us compare some of the characteristics of the two ranges, and see what natural conditions they point to.

The crests of the Central Caucasus are much steeper than those of the Central Alps. The whole southern face of the central group keeps up the average slope of the steepest part of the eastern face of Monte

* Von Thielmann's 'Travels in the Caucasus and Persia,' London, 1875. The English translation is not always to be trusted.

Rosa; it is as if the Macugnaga precipices extended for 10 miles. The northern face is steeper still. Take the steepest bit of the Breithorn, double its height, and spread it along from the Nord End to the St. Théodul, and you may form some faint picture of what the mountaineer sees from the heights above the Bezingi Glacier. He fancies nature has done her utmost in the perpendicular style of mountain architecture. Then he goes up the neighbouring Mishirgi Glacier—quite left out in the 5-verst map—and sees precipices profounder and still more vertical. The northern side you will find is habitually the steepest in these Caucasian granites. I do not say that the slope is so steep for the first 10,000 feet, but it is certainly steeper for the first 6000 or 7000 feet.

Sheer rocks are not in themselves beautiful objects. These Caucasian cliffs and combes owe their strange loveliness—for lovely they are—to the ample folds and exquisite arrangement of their snowy drapery. In a winter run I made to the Oberland last January, the comparative meagreness of the névés and glaciers clinging to the higher Swiss summits was the first thing that struck me. Much of the Caucasus is like the Wengern Alp face of the Jungfrau, or the finest bits on the Glacier Noir under the Pelvoux. Mr. Donkin's photographs of the Bezingi Glacier, and M. de Déchy's of the Mishirgi Glacier illustrate this splendid feature in the scenery.

Descending from the mountain crests on the southern side, the first point to notice is the greenness of the high snowless slopes. Every isolated piece of bare soil among the Caucasian snowfields is a *Jardin*. In one place, at the bottom of the Gvalda Glacier, I noticed a little island of vegetation on the rubbish covering the end of the ice. It is possible, however, that this may have been the result of an avalanche. I gathered flowering plants at a height of over 13,000 feet on Uku. At this height the stalk and leaves are small, the blossoms abundant and vivid. Dr. Radde found flowers 1000 feet lower on Elbruz.* The slopes above the great Gvalda Glacier, from 9000 to 10,000 feet, were green, and the grass was enlivened with poppies, *Anemone narcissiflora*, gentians, ranunculus, campanulas, forget-me-nots, veronicas, geraniums, and varied by the darker foliage and great cream-coloured blossoms of the *Rhododendron caucasicum*. The moraines get covered over very quickly with grass and flowers; which makes them "look pleasanter" (to borrow the phrase of an Irish peasant discovered covering over with moss the stumps of his landlord's trees, which he had illegally cut down). It is also useful to the student of glacial oscillations. For directly the ice begins to advance, its motion is shown by the barrowfuls of unmistakably raw rubbish it heaves over the grassy banks.

* 'Die drei Langenhoththäler Imeritiens,' Tiflis, 1867. My little specimens were unluckily lost out of a pocket-book; one was, I believe, a *Pyrethrum*.

From the high pastures of the mountain goats we descend to the forests. The glories of the Mingrelian woodland have been often though inadequately celebrated. They present in its highest perfection Central European vegetation as opposed to Mediterranean. The forests north of the chain have been less frequently described. The steppe, except in the river-beds, is treeless; but no sooner does the ground begin to rise than wild fruit-trees appear, soon to be succeeded by dense groves of beeches. Azalea and rhododendron—the pink variety (*ponticum*)—flourish under their shade. The glades are bright in summer with millions of golden flowers, probably the *Telekia speciosa*, which the ordinary traveller will mistake, as I did, for wild sunflowers.

The great screen of forests spread along the outer northern flank of the chain, has served as one of the chief protections of the mountain tribes. In old days it was debatable ground. North of it, on the edge of the plain, lay the Cossack *stanitzas*, the life in which has been admirably described by the Russian novelist Count Tolstoi in his early autobiographical work 'Les Cosaques.' The Tartar tribes on the Cherek and Chegem and Baksan held the fastnesses behind it. On its skirts hung the bands of robbers led by their *Djighits* or braves. The word *Djighit* survives. I was myself saluted as one on the crest of the Caucasus by some grateful Tartars whom I had relieved of the labour of step-making in the soft snow.

Even before Russian times these forests had served as a barrier. The Tartars who live behind them have no connection whatever with the Kabardans of the outer hills. They were driven into the mountains by the latter. The Kabardan is a different build of man, slighter, darker, keener-looking, but sometimes effeminate. The Tartar highlanders are broad, big men. The chief of Bezingi is 6 feet 3 inches at least. The Urusbieh princes have mixed blood in them, and any deductions formed from their appearance or manners might be misleading.

The forests extend to the upper end of the limestone gorges. Above them the crystalline schists are bare. Every beam the house-builders of Bezingi and Balkar use, must be dragged a journey of several hours. The shepherd's fires are fed on the twigs and roots of the *Rhododendron caucasicum*, and in consequence the plant is in places almost extinct.

To this barrenness of the upper northern glens, however, there are exceptions. The head-waters of the Baksan and the Uruch, and some of the side glens of the Ardon, have fir and pine-woods. The sudden changes in the Central Caucasus from woodland to barren scenery are very striking. The reason must be mainly in the soil. It is the crystalline schists which are generally bare; the granites* and limestones are clothed in forests.

* E. g. the upper trough of the Uruch, the Zee glen in the Adai Choch group, the glens of the southern tributaries of the Baksan.

The general type of the vegetation is more luxuriant than on the Alps. We grow in our gardens the giant Caucasian snowdrop. That is typical of the Caucasus. The species are larger, the blossoms more abundant, and perhaps less brilliant in colouring; whites and yellows—the colours in which lowland nature welcomes the spring—seemed to me prevalent. There are few (as far as I observed) cryptogamic plants, few of those lovely little stunted mosses which enamel the rocks of the high Alps. No Edelweiss (*Leontopodium gnaphalium*) has yet been met with in the Caucasus proper, but Dr. Radde told me he had found the Swiss species in the Armenian ranges near Kars.* Of gentians there are many varieties, but the species are not, as a rule, identical with the Alpine. Generally the flora has singularly little in common with that of the Alps. A German botanist states that the Alps and Himalaya have more species in common than the Alps and Caucasus. There is no very marked distinction between the character of the flora on the two sides of the chain—at least in the upper region. The broad Armenian Highlands serve far more efficiently as a botanical barrier than the lofty but comparatively narrow line of Caucasian snows.

We were too late last year to see the mountain flora to perfection. It was only close to the snow-line, in northward fronting dells, or where a late-melting avalanche had artificially retarded the spring, that we found blossoms at their best. Botanists should always look out for a green speck just freed from a late-melted avalanche, if they want to find the early mountain blooms after their season. Primulas, which abound, were nearly over. A beautiful golden crocus (*Crocus Suworovianus*) we found only on the Goribolo Pass. Tall yellow lilies were abundant: of wild roses I noticed several varieties; one that was white, delicately flushed with pink, was the commonest. Strawberries, raspberries, and currants abound on the south side, particularly in the glen of the Skenes Skali.

The flora of this basin or of the spurs of the Leila is one of the most wonderful sights imaginable. As our party defiled through the open glades, a horse laden with baggage was entirely hidden by the growth of flowers; the head and shoulders only of a mounted man rose above them. The bright blossoms of *Telekia speciosa*, huge umbelliferous Heracleums, and a species of Campanula grew to a height of six to eight feet. Dr. Radde in his 'Vorträge' gives a list of some of the plants composing this vegetation. His works should be studied by all who are interested in Caucasian botany.†

It is curious that in the neighbouring glens, about the Rion and

* I protest in passing against the application of the term Little Caucasus or Anti-Caucasus to these ranges, which have nothing in common except politically with the Caucasus.

† 'Vier Vorträge über den Kaukasus,' Petermann's Mitt., Ergänzungsheft 36; 'Die drei Langenhoththäler Imeritiens,' Tiflis, 1867, &c.

Ingr sources, the grass and flowers only attain a moderate and more ordinary height. This may be partly accounted for by a greater power of retaining moisture in the soil in the Skenes Skali. Doubtless also, the absolute abandonment by man of these glens (they were once inhabited, and within the last ten years a few huts have been raised in one of them)—so that summer after summer the rank crop has rotted where it grew—has helped to produce the prodigious and embarrassing tangle which now astonishes the traveller's eyes and trammels his feet.

Two remarkable deficiencies of the Caucasus ought perhaps to have been noted before the flowers and forests. It possesses no remarkable waterfalls, and neither lakes nor tarns—neither submountainous lakes like Como, Garda, Geneva, Luzern; nor tarns like the Daubensee, those of the Engadine and Grimsel, and the dozens that dot certain districts of the Alps. I have used that rarely desirable form of assertion, a universal negative. As to tarns there are exceptions, but only enough exceptions to prove the rule.

Waterfalls worth looking at are not very common even in the Alps. I would not attach to their absence more weight than it may reasonably bear. An inference might be drawn in favour of the Caucasus having been more waterwashed, of the torrents having had force to cut themselves a way out of their difficulties without recourse to frequent and violent leaps. Geologists may find other reasons in the disposition or dip of the strata.

But the absence of lakes is a very grave matter. Mr. Darwin once told me that Sir Charles Lyell had come to him holding up in his hands my book and exclaiming, "No lakes in the Caucasus!"* This fact has to be met by those who believe that the great extinct glaciers excavated lake-basins. They may meet it in several ways: they may either assert,—that "the Caucasus never had a glacial epoch"; or that—"its glaciers excavated lake-beds which have been silted up by the results of subsequent denudation."

The evidence might well be fuller, but there is, I imagine, quite sufficient good evidence from erratic blocks that the glaciers of the Caucasus did once reach to the northern plains to entitle us to dismiss the first supposition. Great lakes at the foot of the chain, for example, in the plain where Vladikafkaz now stands, may have been silted up. But even if this were admitted the absence, or extreme rarity, of tarns would remain to be accounted for.

I have formed and had expressed here definite opinions as to the extent of the powers of ice as an excavator, whether in digging lake-basins or boring valleys. But on second thoughts I have, so as not to interrupt the thread of this descriptive paper, transferred what I have to say to a separate note, which will be printed in the next number.

In their oscillations Caucasian and Alpine glaciers have of late years

* See Lyell's 'Student's Elements of Geology,' p. 163, edition of 1871.

shown a remarkable correspondence. In 1868 the Caucasian ice was all in retreat. About 1875 the tide turned; last year the glaciers we noticed were, as a rule, sensibly advancing. The Alpine and Pyrenean glaciers are now coming on apace, those with the steepest courses and the greatest velocity naturally taking the lead in the forward march.*

I note in M. Reclus's work a statement that "the Devdorak Glacier on Kazbek has advanced four times as fast as the glaciers of Mont Blanc." Such an assertion is not precise enough to be criticised. Is the comparison with the Bossons Glacier, or with the mean of advance of the great glaciers of the Mont Blanc chain? Is the rate of motion of the ice or the advance of its snout the subject of comparison? These will obviously differ. There is no such thing practically as an average rate of motion for glaciers, any more than there is a rate of running for water, in a chain. Each stream, frozen or melted, will be governed by a crowd of local conditions.

These great glaciers, these heavily snow-draped peaks and ridges, this rampant vegetation, all point to the conclusion that the Western Caucasus has a moist climate. They point also to the fact that it has no long dry season. The part of the Alps the flora recalls most is the Dolomites, or Venetian Alps. It rains enough in spring or winter in Corsica or the Maritime Alps; but there you will find comparatively few flowers above the zone of artificial irrigation: and the reason is obvious—the long summer drought. We have statistics that bear out this conclusion, returns of meteorological observations from Stavropol, Vladikafkaz, and the Caucasian Baths north of the chain, from Batum, Kutais, Sukhum, Poti, Gori, Tiflis, to the south. Observations from Oni, or Betsho, or Kazbek, in its heart, are still a desideratum. The rainfall map in Reclus will require correction by the light of the recent publications of the Russian Meteorological Office.†

The heaviest fall, sometimes over 100 inches per annum, is where the sea-winds strike the first hills at Batum and Kutais. It is somewhat less at Sukhum, and diminishes also westwards towards Kertoh. Generally, of course, the tendency is to relative dryness as you go eastwards from Kutais across the peninsula. At first sight it seems a curious exception that the rainfall at Vladikafkaz (40 inches) should exceed that of the Caucasian Baths (18 inches). This, however, is sufficiently explained by the fact of Elbruz acting as a great condenser, drawing to itself clouds which pass more easily through the gap of the Mamisson.

Generally, the climate of the Western Caucasus is much moister and less hot than that of the Western Pyrenees. The rainfall at Kutais is double that at Pau, and about equal to that at Tolmezzo at the head of the Adriatic; the mean annual temperature, two degrees less than

* See M. Forel's articles in the 'Jahrbücher' of the Swiss Alpine Club.

† Wild, H., 'Die Regen-Verhältnisse des Russischen Reiches,' and 'Atlas, St. Petersburg, 1887.

at Pau. The climate of Tiflis is wetter, but somewhat warmer, than that of Madrid. The plains north of the chain suffer greater extremes of temperature than the Swiss lowlands. Summer comes in with a burst in May, but June or July are often among the wettest months.

Readers will expect to be given a figure for the snow-level. Natural philosophers have spoken disrespectfully of late of the sea-level. I find our President suggesting that it may vary to an extent of 500 feet.* I may be excused, therefore, if I have a fling at that vague old abstraction "the snow-level." For "the Caucasus" it is impossible to lay one down precisely. The chain extends over five degrees of latitude; more than that, its rainfall is at least four times at the Black Sea end what it is at the Caspian. Naturally at one end snow lies permanently at about 9000 feet, at the other at about 12,000 feet. In the central part of the chain nothing like continuous snow-beds are found under 9500 feet, and on the northern spurs, where there is less fall, and where black slate slopes facing southwards are exposed to a sun which raises the steppe temperature to over 90° F., it will rise in places to over 11,000 feet. We may take 10,000 to 11,000 feet as about the snow limit. But, as I have said before, this limit must be represented by an acutely zigzag line going up and down, according to accidents of exposure, soil, and vicinity to large glaciers. Let us get rid altogether of a statement frequently repeated, that Dr. Radde found the snow-level 8400 feet at the Rion sources. What he wrote was, that in September he found patches of *fresh-fallen* snow at that height. This is how error is created by inaccurate copyists!

This humidity of the summer climate is at once a charm and a vexation to the traveller. When the west wind blows in fine weather, clouds and a shower come up every afternoon from the Black Sea. The mountaineer risks being befogged—no slight risk on the vast snow-fields. The snow on steep slopes is kept in a very hazardous condition. One day last year I heard a whole mountain side—the upper slopes of a *névé* basin—hissing with the downsliding of surface snow.

On the other hand, the atmospheric effects are beautiful and varied. The sky of the northern steppe is luminous and soft; the distances are at once distinct and deep in tone; there is none of the harshness of outline of Switzerland. The light is the light of the East; the colours are those of the Roman Campagna, to which on an enormously magnified scale there is a rough general resemblance in the landscape. Up in the mountains of Suanetia, the climate, when the west wind blows, reminds one of fine weather in the English Lakes. Scarves of mist play in and out of the great towers of Ushba; the tangled maze of low, long, wooded ridges and deep glens, of flashing streams and white-towered villages is now half veiled in a passing shower, now lit up by brilliant arrows of sunshine. In clear north-east-wind weather the sky is of

* 'Lectures on Geography,' by Lieut.-Gen. Strachey, R.E., C.S.I., F.R.G.S., p. 83.

a less hard blue than in the Alps; and sometimes in the morning, under a cloudless vault, the mountains gleam through the thinnest perfectly transparent golden haze, a Coan drapery which melts as the day goes on.

This consideration of weather has led me into scenic description. Here, then, I will try to answer the question one is so often asked: "Is the Caucasus as beautiful as the Alps?" Such questions are so much easier to ask than to answer! Are you who ask me a lake-lounger, a mule-rider, an artist, or a mountaineer? For those who like the outskirts of mountains (I put aside, for the moment, all question of creature comfort) the Alps are preferable. The Caucasus has no lakes; the outer southern valleys do not equal those of the Italian Alps; the northern valleys above the gorges and below the glaciers are less varied and attractive than those of Switzerland.* I think I may best convey the distinction by saying that as a whole the Caucasus is less picturesque but far more romantic. Its scenery appeals more to the imagination; even when it is stern it is rarely commonplace.

The scale is larger. The view of the great range from the railroad, half-way between the Caucasian Baths and Vladikafkaz, altogether dwarfs that of the Alps from the Lombard plain. The rare incidents in the foreground, the grassy barrow of some Scythian prince, the turbaned headstone of some Tartar chieftain, or the low white cottages, glittering church-spire, and sunflower fields of one of the Cossack villages that line the old military march, may not indeed compensate in the eyes of some travellers for the absence of frequent villas and campaniles. Frenchmen—even Frenchmen of genius—have found the Roman Campagna insupportable! And the old-fashioned and, highly respectable sentiment that whatever is waste is horrid (which made Cobbett disparage heather) is more common among contemporaries than they care to avow. Travellers need not be ashamed of their preferences, so long as they are honest and not the result of ignorance. There is scenery, like music, for every mood and mind. Caucasian scenery, I repeat, belongs to the romantic school. It produces impressions rather by broad effects than by crowded details. Compared with the mountains, the forests and flowers of Suanetia, the alps and pinewoods and chalet-dotted meadows of Grindelwald look stiff and small; even the great Italian valleys yield in sublimity.

Nowhere is the beauty of forests brought so close to the glory of snow and ice. The interval is not that grim debatable ground of rock and

* The finest northern valleys I have seen are those of the Uruch, the Cherek, and the side glens of the Baksan.

† I use the word "alp" here in its proper first sense, a common pasturage. Chalet is seldom circumflexed, except by British authors. It designates properly not a farmhouse inhabited all the year round, but a dwelling on the "alp" used in summer. Its derivation is probably from *casa*, *casoletta*. The reasons why French writers avoid the circumflex are, I imagine, that there is no written form *chaslet* in old French literature, and that they follow the modern pronunciation.

rubbish Alpine travellers know too well, it is carpeted with hay-meadows. I think any traveller who rides in fair weather over the Latpari Pass and then crosses the low spurs of Tetnuld to Mugal and Betsho, will agree that the Alps must yield, that neither the Oberland nor Monte Rosa can show such a combination of sylvan scenery and splendid snows. Three of the objections constantly made by painters to Switzerland do not apply here. The atmosphere is pure and lucid, but not harsh; there are fewer dull barrennesses; the forests are not monotonous pine-woods but a rich medley of European forest-trees brightened by an undergrowth of laburnums, azaleas, and rhododendrons, and broken by glades full of flowers that grow six feet high. Of course the scale of the scenery makes it difficult to treat in art. But we must not allow our friends the artists to set up a technical and egotistical standard. We admire in nature not what is more or less imitable by the brush, but what is most delightful to the eye and most stirring to the imagination.

The relations of a country to its inhabitants ought not to be excluded from the view of a geographer. But the ethnology of the tribes.

Caucasus is far too vast a subject for the last paragraphs of a short article. All that will be possible here is to offer a few broad outlines, which must be filled in elsewhere.

The mountains have not, as was once popularly held, furnished a cradle to a great branch of the human race. "The Caucasian" of Cuvier in this sense is really "played out." Even a poet might now hesitate to write of the "supreme Caucasian race." Rather the Caucasian highlands have been the refuge of portions of many races, a museum where many invaders of Europe have left behind raw samples of themselves before they were manufactured into nations.

We hear much nowadays of nationality. Its more extreme advocates need, perhaps, to be reminded that no great nation has ever been made except by the amalgamation of nationalities; that to pick to pieces a political unit, say, like France or Switzerland, in order to restore individuality to its components, Provençal or Breton, Romance or Teuton, would be to try to reverse the order of the world's political development?

Russia in the Caucasus in welding different races into a political unit under a civilised government is engaged in the task of civilisation. In this process the chief Aryan races of the isthmus, the Armenians and Ossetes, are, as might have been anticipated, coming to the front. Of the Armenians it is needless to speak. But for the Ossetes the conquest of the Caucasus by Russia might have been long delayed. This Iranian tribe, known to ancient history as the Alans, held at one time the wide plains north of the Dariel Pass. So thickly was the country inhabited that the Arab geographer, El Masudi, affirms that their ruler could lead to battle 80,000 horsemen, and repeats a proverb that when one cock crowed, all the cocks in the country answered. But at some unknown epoch, the Ossetes were driven back on the mountains by northern

hordes. Under the Byzantine Empire they had been Christianised, but in the ninth century they are said by El Masudi to have expelled their clergy and returned to paganism, several of their communities nearest the Mohammedans of the Kabardah accepting the faith of their neighbours. Creed and custom seem to sit lightly on the Ossete nature. So adaptable is it that in the summer of 1886 a young Ossete officer was the indispensable leader and organiser of cotillions among the Russian society at Pätigorsk. Their ancient laws and institutions have been recently examined by Prof. Kovalevsky, who has also investigated those of two minor Iranian tribes, the Pchavs and Chevsurs.

Russia was fortunate, when at the end of the last century she acquired Georgia by cession from its native prince, in finding the road to Transcaucasia in the hands of the Ossetes. They held both sides of the chain, and the comparatively low and easy horse-passes between the icy wall of the Central Caucasus and the mountain maze of Daghestan. Thus they interposed an effectual barrier between the wild tribes of the Caspian wing and the Western Highlanders, between on one side Schamyl and his followers, and the Circassian confederacy and its allies on the other. The Avar chieftain through all his struggles never succeeded in joining hands with the warriors of the Kuban.

In one sense the range of the Caucasus has acted more effectually as a barrier than any other mountain chain of the Old World. Until the Russian eagles crossed it no conqueror had ever descended on Tiflis from the north. The "Turanian" hordes—Asiatics from north of the Caspian, perhaps, it is wiser to call them—established themselves under the shadow of Elbruz, and became mixed up with still more obscure races in Daghestan; but they did not traverse the great chain.

Daghestan is said by all who have visited it to have a character of its own, to be unlike either the crags and forests of the western highlands, or the ice-encircled valleys of the central chain. Bare bleak limestone plateaus are there separated by deep gorges and arid ridges. Among these fastnesses is found a confusion of tribes and of tongues, Avars, Hurka, and Kurin (a list of their names and numbers will be found in vol. xvii. of the 'Journal of the Royal Asiatic Society'). But ethnologists have still much to do before they can furnish us with an exact account of the origin and affinities of these human fragments, left like erratic blocks on the mountains to mark the course of the waves of humanity. Many doubtless are Central Asiatics; some probably Georgian—whatever that may be. There are said to be also races of Arabian stock!

The Georgian or Colchian family remains unclassed. Herodotus records a tradition that it was of the same origin as the Egyptian. It is at present treated as an independent family by ethnologists, who include in it the Imeritians, Mingrelians, Laz, and Suanetians. Among the last-named a mixture of independent elements will probably be recognised on further study.

To the west dwell—or dwelt—the Abchasians and Cherkees (the Circassians of romance), tribes of whose origin, affinities, and customs we have still no fully satisfactory account. Recent enquiries pursued among Circassian exiles in Turkey have led a German investigator to the belief that the leading families at least had connections with Arabia.* *Æschylus*, we may remember, wrote of “the martial bloom of Arabia, who hold a citadel on lofty crags hard by Caucasus.” Are the Circassians Semites? What is their language? Much remains to be done in investigating the antiquities and origins of these loose confederacies of chivalrous but semi-barbarous tribes, and in clearing up their historical connection with their neighbours on the north, the Tartars of Karatchai and Uruspieh, and the tribes of the Kabardah, who apparently came eastwards from the Crimea.†

It is time that I brought to an end this discursive—some may call it, not unjustly, desultory—paper. I shall submit cheerfully to the criticism, if by touching on very various topics I have, perchance, attained my object, to show that it is not only to mountaineers and geographers that this great mountain country is interesting. The Caucasus ought for many years to come to provide ample material for workers in every branch of natural science, as well as for historical and ethnological students; and, last but not least, for the lover of noble scenery and primitive life who views the outward shows of the world without committing himself to the special study of any particular “branch” of knowledge,—

“Contented if he may enjoy
The things which others understand.”

Meteorology of the Red Sea and Cape Guardafui.‡

By General R. STRACHEY R.E., F.R.S., PRESIDENT R.G.S.

Charts, p. 748.

Weather Charts of the Red Sea for January and July.—In these charts, which have been prepared in the Marine Branch of the Meteorological Office, under the supervision of Captain Toynbee and Lieutenant Baillie, the usual system of exhibiting the pressure and temperature, by isobars and isotherms, has not been adopted, as the necessary information is entirely wanting. The diagrams,

* ‘*Petermann’s Mittheilungen*,’ vol. xxxiv.

† For further information on Caucasian ethnology, see Klaproth, ‘*Voyage au Caucase*’; ‘*Journal of the Royal Asiatic Society*,’ articles by Mr. R. N. Cust (with list of authorities) and Mr. D. Morgan, vols. xvii., xviii.; ‘*Petermann’s Mittheilungen*,’ vol. xxiii.; V. Müller’s ‘*Ossete Studies*’; Prof. Kovalevsky’s, Usalar’s, and Schiefner’s works (in Russian); E. Chantre’s finely illustrated volumes. The above references are incomplete, but they may suffice to set a student on the track. A fine ethnological map of the Caucasus has been published by the Government.

‡ Read to the Geographical Section of the British Association, Bath, Sept. 6th, 1883.

therefore, have been prepared so as to give what may be termed a sectional view of the data recorded, referred to a line supposed to be drawn along the axis of the Red Sea, corresponding to the usual tracks of vessels, and prolonged in like manner through the Gulf of Aden.

'January. North-east Monsoon Season. Wind.—The northerly wind blows almost uninterruptedly from the Gulf of Suez to about 23° N., and continues as the prevailing wind to about 19° N., whilst further to the southward the south-easterly wind prevails. From 23° N. to about 15° N. there is a mingling of the winds from the principal directions of north and south-east, and from 18° to 20° N. the winds from these directions are of almost equal frequency (this area is shaded darker in the diagram). In the Gulf of Aden the wind is principally easterly, and draws somewhat from the northward in the eastern part. Calms are most frequent between Aden and 20° N., but they form a very small proportion of the observations. The force of the wind is rather stronger with the south-easterly winds than with the northerly, and the strength of a moderate or fresh gale is frequently met with between Perim and 20° N.

Barometer.—The mean height of the barometer ranges from about 30·10 inches in the Gulf of Suez to 29·97 inches in about 15° N., giving a gradient of 0·13 in about 1100 miles. A second maximum about 30·06 inches is shown in the eastern part of the Gulf of Aden, giving a gradient of a rather smaller amount, but extending over only about half the distance or less. The results deduced from the several sources (logs in the Meteorological Office, of P. and O. ships, and from the Admiralty) agree well among themselves.

Air Temperature.—The mean air temperature ranges from about 64° in the Gulf of Suez to 79° in 16° N. In the Gulf of Aden the mean temperature is generally about 77° .

Current.—The general drift of the current is to the westward in the Gulf of Aden and to the N.N.W. in the Red Sea; its strength is very light, and nowhere does it exceed a knot an hour; as a rule it is less than half a knot an hour.

Sea Temperature.—The mean sea temperature ranges from 65° in the Gulf of Suez to 79° in 19° N., and from this position southward, as well as in the Gulf of Aden, the temperature is between 77° and 79° . These temperatures are somewhat higher— 1° or 2° —than those of the air.

Specific Gravity.—The mean specific gravity ranges from 1·0314 in the Gulf of Suez to 1·0270 in the Gulf of Aden, the decrease being fairly gradual.

July. South-west Monsoon Season. Wind.—The direction of the wind is generally from the northward and north-westward over the whole area of the Red Sea, drawing more westerly in the southern part, whilst in the Gulf of Aden the prevailing direction is westerly and south-westerly. The mean force of the wind is about the same in different parts of the district, but the individual observations show that the force of a gale is attained only in the Gulf of Suez and in the Gulf of Aden, strongest in the latter. Calms are about twice as numerous as in January and now form about 15 per cent. of the total wind observations.

Barometer.—The mean barometer ranges from 29·79 inches in the Gulf of Suez to 29·67 inches off Aden, being throughout about 0·30 inches lower than in January. The results obtained from the Meteorological Office and P. and O. observations are in good agreement. The gradient between the northern and southern ends of the sea remains about the same, but the minimum in lat. 15° N. is no longer observed, and with it the relatively high pressure over the Gulf of Aden also disappears.

Air Temperature.—The mean air temperature ranges from about 82° in the Gulf of Suez to 90° in the southern part of the Red Sea. A sharp fall is shown on approaching Perim, and a second minimum of 84° is reached off Aden. These

temperatures are higher than those of January by 18° for Suez, 11° for the southern part of the sea, and 7° for the Gulf of Aden.

Current.—The current is excessively slight in the Red Sea. A tendency to a south-south-easterly set is, however, indicated between 17° and 20° N., and there is also some evidence of a very weak northerly set in the northern part of the district. On approaching Perim there is an indication of a current setting from the Red Sea through the straits of Báb-el-Mandeb. In the Gulf of Aden a strong easterly current is manifested on the Arabian side, and a somewhat weaker current is shown to be setting to the westward on the African side.

Sea Temperature.—The temperature of the sea ranges from 77° in the Gulf of Suez to 89° in the southern part of the Red Sea, and like the air temperature it then decreases rapidly to 84° near Perim, the minimum of 81° being reached off Aden; in the eastern part of the gulf it again increases to $84^{\circ}\cdot5$. These temperatures are respectively higher than those observed in January, by 12° at Suez, 10° in the southern parts of the sea, and from 3° to 5° in the Gulf of Aden. The sea temperature in July in the Gulf of Suez is 5° lower than that of the air, in the southern part of the sea about 1° lower.

Specific Gravity.—The specific gravity ranges from 1·0310 in the Gulf of Suez to 1·0267 off Aden, whilst a slight increase is shown in the eastern part of the gulf.

The winds and the currents at the two seasons obviously follow the pressure and temperature. The northerly winds which predominate throughout the year over the northern part of the sea conform to the permanently higher pressure over the Gulf of Suez. The southerly winds of the winter in the southern part of the sea are at once seen to depend on the low pressure 29·97 in about latitude 15° compared with the higher pressure 30·06 over the Gulf of Aden, where again in consequence easterly winds prevail. The greater strength of the southerly winds as compared to the northerly in January is attributable to the steeper gradient between the high pressure area over the Gulf of Aden and the low pressure at latitude 15° , as compared to that between the latter and the Gulf of Suez.

The low pressure over the southern part of the sea is evidently connected with the permanently high temperature over the same area.

The northerly currents noted are very slight, and some introduction of water from the Indian Ocean is obviously necessary to replace the loss by evaporation which must be considerable. Although I have not the precise figures to refer to, I may also mention that there is a perceptible variation in the level of the sea at various seasons, amounting it is said to a foot or two at least, dependent on the prevailing winds in the Gulf of Aden or Indian Ocean. This subject will require further examination in connection with that of the tides at the two extremities of the sea.

Sea Temperature, Currents, and Winds in the vicinity of Cape Guardafui during the South-west Monsoon months.—From a notice issued by the Hydrographer in 1882, it appears that during the six preceding years seven vessels had been wrecked and three stranded in the neighbourhood of Cape Guardafui, and it was then considered desirable to republish the available information bearing on the navigation of that locality.

The wrecks spoken of, chiefly occurred during the period of the south-west monsoon—April to September. At this time vessels bound westward through the Gulf of Aden usually approach Cape Guardafui from the southward, passing between that Cape and the island of Socotra. The weather during this season in the neighbourhood of the coast is usually stormy accompanied by a heavy sea, the currents are strong, and the land frequently obscured by mist and haze.

In such circumstances it often becomes difficult or impossible to ascertain the ship's position by astronomical observation, and all indications of the proximity of the land become useful. Special attention has therefore been directed to the conditions of the weather and sea in the vicinity, and the available information is in course of compilation in the marine branch of the Meteorological Office, the maps now shown being the results of the enquiry as far as it has yet been carried.

The facts which the charts exhibit have been more or less well known for some time past, but it was very desirable that they should be verified as completely as possible, and that errors should as far as possible be eliminated and corrected, not only with a view to the practical value of accurate knowledge, but also to its bearing on the interesting phenomena of ocean temperature and circulation.

Sea Temperature.—The temperature of the sea surface is seen to be much higher off Cape Guardafui than off Rás Hafún, during most of the south-west monsoon months. In June, July, and August this feature is especially marked, the temperature off Cape Guardafui being generally 80° or upwards, whilst off Rás Hafún it is generally below 70°, and often fully as low as 65°. The area of cold water along the African coast between Cape Guardafui and Rás Hafún is very obvious, though the want of observations makes it difficult to define its exact limits. In June the isotherm of 75° is seen to lie only 3 or 4 miles to the southward of Cape Guardafui, and in August the isotherm of 70° is not above 20 miles distant. In September, during which the south-west monsoon is still blowing, the conditions, however, become more uncertain, though the cold water is shown generally to the southward, and the average temperature is much lower off Rás Hafún than off Cape Guardafui; on the other hand, the thermometer ranges high not far from Rás Hafún, and low at a very short distance from Cape Guardafui. In like manner in May, when for a part of the month the north-east monsoon often still blows, and the south-west monsoon if blowing has not reached its full force, the water is fairly warm over the whole area.

The series of charts for the four months clearly shows that as the south-west monsoon season advances the difference of temperature between the northern and southern parts of the area becomes much more strongly marked, the isotherms are closed, and their distribution more complicated.

Wind. Direction.—The wind seems to draw more southerly near Cape Guardafui than it does farther to the southward, and on rounding the Cape, and standing into the Gulf of Aden, the direction is often found to be south-easterly.

Force.—The force of the wind is very strong over the whole area south of Cape Guardafui embraced by the diagrams, in July and August, but in the other two months, June and September, strong winds are occasionally met with.

Sea or Swell.—The direction of the sea or swell is nearly always with the surface wind, and the observations show that to the south of Cape Guardafui the sea often runs very high.

Current.—The current generally sets to the north-eastward; the observations of this element are, however, too few and too scattered to allow of any very satisfactory conclusions being drawn as to changes of direction in different parts of the area dealt with.

The velocity of the current ranges from about 20 to 80 miles a day, and is stronger in July and August than it is in June or September. The daily rate is indicated on the diagrams on the shaft of the arrow.

Weather.—Mist is very prevalent in all the four months from June to September, and it appears to be general over the whole of the district.

It would be premature at present to offer any opinion whether the remarkably cold water met with near Rás Hafún, is simply due to the current from the south, or

whether it may not in part at least be the result of the colder water from below being brought to the surface by the action of the south-west winds, which during the summer months blow so strongly off the east coast of Africa. The examination of the data for the winter months, during which the north-east monsoon prevails, will assist, no doubt, in arriving at a correct conclusion.

GEOGRAPHICAL NOTES.

British East Africa.—We call the attention of our readers to the interesting paper on "The Commercial Future of [East Africa," by Sir Francois de Winton, read to the Geographical Section of the British Association at Bath, and given at p. 722 of the present number of the 'Proceedings'; in which an account is given of the Imperial British East African Company, just instituted under a Royal Charter, for the development and administration of the British Protectorate in that region. News has arrived of the safe arrival at Mombasa, the chief port of the Company's territory, of the first party under Mr. G. S. Mackenzie, one of the Directors; and Lieutenant H. G. C. Swaine, R.E. (known for his official surveys in Somali-land) has been commissioned to explore the interior with the view, in the first place, of finding suitable stations. Great additions to our geographical knowledge may be expected from these pioneer explorations, and our Society has made a grant of instruments to Lieutenant Swaine to aid him in making the fullest use of his opportunities.

Dr. Hans Meyer's Second Expedition to Mount Kilima-njaro.—In consequence of the disturbed state of the country on the East Coast and in the interior of East Africa, Dr. Meyer's new expedition to Kilima-njaro has been suddenly brought to a termination. The large caravan, which started from Zanzibar about the middle of August, was disbanded a month later in North Usambara.

The Mai Kassa, or Baxter River, New Guinea.—This river, which discharges itself into Torres Strait about 80 miles west of the Fly river, has been hitherto considered as belonging to the great delta region of the Fly; but a recent survey (in April and May last) by Mr. C. E. Strode Hall, under the orders of the Commissioner of British New Guinea, has definitely ascertained that it constitutes a small and curious independent river system. Mr. Hall followed up in succession, to their sources, all the streams, fifteen in number, tributary to the two main channels of the river, and found that the furthest source was distant about 25 miles from the Fly. From the observations taken, he says it is proved that the distance up the river travelled by Captain Strachan, and also the size of the tributaries, were greatly overestimated by that gentleman. The country on the banks beyond the mangrove zone is low-lying, open

forest country, and generally of very poor soil. The natives Mr. Hall had with him worked splendidly.

The Distribution of Heat and Rainfall in Japan.—An interesting paper on this subject is contributed by Herr J. Hann to the current number of Petermann's 'Mittheilungen.' As the basis of his calculations, the author has utilised principally the reports and various publications of the Imperial Meteorological Observatory of Tokio. In consequence of the large number and favourable position of the meteorological stations throughout the Japanese Empire, there is an exceptionally valuable amount of material available for arriving at trustworthy results. With regard to temperature, the author's conclusions are as follows:—(1) The increase of temperature with decreasing latitude is rapid on both the east and west coasts, but is more so in the north than in the south, and also on the east coast than on the west. (There is an exception to this in spring-time on the west coast.) (2) The change of temperature with the latitude in the southern part of the empire occurs more slowly along the east than along the west coast; in the northern part the reverse is the case. (3) The mean annual temperature shows the west coast up to about 36° lat. to be a little cooler than the east, but north of 38° lat. it is considerably warmer. The same is true as regards the spring and winter temperatures, with the exception that in spring the west coast is, up to about 39° lat., considerably colder than the east. The fact that 36° lat. is about the point where the west coast begins to be warmer than the east is thus accounted for by the author. About 36° lat. the long axis of the island of Nippon leads from an almost east and west direction to a line running north and south. The consequences of this are, first, that the cooling influence of Eastern Asia is lessened as regards Japan and the west coast by the increased breadth of the Sea of Japan above this point; and, secondly, that the warm current of the Kuro Siwo, which, coming from the south keeps along the south-eastern coast of Japan, turns eastwards at 38° lat., and the east coast north of 36° lat. is influenced by the cold Kurile current which extends down the coast as far south as Cape Daihosaki. The whole of the west coast, on the other hand, is washed by a branch of the warm Kuro-Siwo current, the effect of which on the temperature is increased by the preponderating west and north-west winds. The coldest month everywhere, with the exception of the north-east part of Yedo, is January, the hottest is August; September is considerably warmer than June, and the mean temperature of October is the same as that of May, but in the extreme north-east October is much warmer than May, and the temperature nearly equals that of June. There are other interesting conclusions to which the author arrives, but we are unable for want of space to notice them. With regard to the distribution and amount of rainfall, it appears that the region of the greatest rainfall is the south-east, especially the east coasts of Kiusiu and Sikoku, where the fall amounts annually to

from 90 to 100 inches, and also the middle portion of the west coast of Nippon, where it reaches 100 inches. On the east coast north of 36° the rainfall, like the temperature, appears to be diminished by the influence of the cold Kurile current. The west coast, with the exception of the extreme south, receives more rain than the east. In the south of Japan the principal rainy season is in June, and the secondary season in the month of September; the reverse is the case in the middle of the east coast. On the west coast the summer maximum fall is in July, and the autumn maximum in November. Speaking generally, the autumn and winter rainfall is greater on the west than on the east coast, in consequence of the prevailing winds.

Colonisation in North Japan.—The results of Japanese colonisation in the northern islands of the empire are detailed in an interesting report on agriculture in the Hokkaido, which has been drawn up by Mr. J. J. Quin, Her Majesty's Consul at Hakodate, and published by the Foreign Office (Annual Series, No. 399). The first attempt at colonisation on the part of the Japanese Government dates from the year 1869. Previous to that time fishing and the gathering of edible sea-weed were practically the only industries carried on. In 1869 a Colonisation Department was formed for the purpose of developing agriculture and inducing settlers to come to the Hokkaido; a survey of Yezo was also made for the first time. Since that date efforts at colonisation have been made continuously under various administrations, but with only a moderate amount of success. The chief hindrances are (1) the dislike of the Japanese to leave their native place and surroundings; (2) the severe winters of Yezo, which last four or five months: at Hakodate the snow lies on mountains not much more than 2000 feet high till after the commencement of June; (3) the fact that only one crop can be raised in a year, as against several successive crops in the south of the Empire. Notwithstanding these drawbacks, nearly 45,000 acres of arable and rice land have been reclaimed since 1869. The rice land is mostly in the neighbourhood of Esashi and Hakodate, the southern portion of the island, while the arable land lies round Sapporo and Mom-betsu. Between the years 1869 and 1886, there were 22,034 houses erected and 106,302 persons brought to the island by the Colonisation Department. In 1869 there were 48,867 Japanese in the island, whereas in 1886 the total population was 225,958. The various articles of farm produce which succeed best in the Hokkaido are wheat of various kinds, barley, millet, sorghum, hemp, buckwheat, maize, potatoes, rice, and oats. A large number of fruit trees have been introduced, of which apples and grapes have succeeded best. Sericulture has been tried with encouraging results, and likewise horse-breeding. Many other undertakings have been started by the Government with varying success, and vast sums of money have been spent, for which no proportionate return has, as yet, been seen, but the Consul is hopeful that the earnest

endeavours which are still being made to develop the agricultural and other resources of the Hokkaido will prove more fruitful in the future. As regards the Aino population, it is only recently that any attempts have been made to induce them to cultivate the soil; they consequently still remain largely a hunting and fishing people. No census of the Aino population has been taken, but it is estimated that it numbers about 14,500, and the general impression is that they are gradually disappearing.

General Prejevalsky's New Expedition to Tibet.—General Prejevalsky, the indefatigable Russian explorer, started on August 30th last upon his fifth expedition to Central Asia. He is accompanied by Lieutenants Roborovsky and Koslov, and has an escort of twenty-four Cossacks.

A Journey in Tenasserim.—M. Leon Fea, the Italian naturalist, who for the last four years has been travelling in Upper Burma with the primary object of collecting specimens, made in the beginning of the present year a tour of exploration in the mountains which form the eastern boundary of Tenasserim. Starting from Moulmein he ascended the Dagyeing-Myit as far as Kiondo, and then turning south-east journeyed by land along the banks of the Hounng-daran to Mitau, whence he struck across to the Mulai range, which lies between Siam and Tenasserim. His journey has resulted not only in the collection of an extraordinary number of new and interesting species, but in a considerable addition to our very imperfect knowledge of the geography and topography of the region traversed. A full account of the journey is published with a map in the Bulletin of the Italian Geographical Society (1888, p. 627).

Mr. Lindsay's Second Journey across the Australian Continent.—For the second time the continent of Australia has been traversed by the South Australian explorer, Mr. D. Lindsay. Accompanied only by a native boy, eight years of age, he left Port Darwin in the north in September 1887, and six months later reached Adelaide. For transport purposes four horses were used. The traveller spent a few weeks in the gold-fields lying 150 miles south of Port Darwin, and accomplished the 900 miles from there to the McDonnell ranges in five weeks and two days, without meeting with any mishap. With the exception of isolated stretches of sand-hills and spinifex which defy cultivation, he is of opinion that all this country might be utilised for cattle rearing with considerable chances of success, as soon as the trans-continental railway is further advanced. On the other hand, the land is not suited for agriculture. Mr. Lindsay stayed three months and a half in the McDonnell Mountains, where he had in 1886 discovered rubies and garnets.

Antarctic Exploration.—It seems probable that the efforts made by Dr. Neumayer and others to organise a German Antarctic expedition will be successful. Mr. H. Villard, a German-American citizen, has interested himself in the movement, and has subscribed a considerable sum towards the equipment of the expedition. All that is now required is that the German Government will give its support to the scheme.

The United States Survey.—From a preliminary abstract of Major Powell's report on the work of the U.S. Geological Survey, for 1887-8, which is published in 'Science,' we learn that in the topographical department, an area of 52,062 square miles was surveyed during the year. It was originally intended that the new topographical map should be on the scale of four miles to the inch, but in the last two years the methods of work, the instruments and appliances, as well as the skill and efficiency of the topographers, have so greatly improved that it has been decided to make the general scale two miles to the inch, while the original 4-mile scale will be adhered to for high mountainous regions, and arid plains and plateaus. Under the charge of Dr. Arnold Hague the survey of the Yellowstone Park has made much progress. Dr. Hague's attention has been forcibly drawn to the importance of the Yellowstone Park as a storage area for the head waters of some of the largest tributaries of the Missouri, and also of the Snake river. Yellowstone Lake is the largest natural reservoir of the Rocky Mountain region, and may be made an important factor in the prosperity of future populations of the country adjoining the lower courses of the Yellowstone, who will be dependent on its waters for irrigation.

Heligoland.—In some notes embodying the results of his own observations, contributed to the 'Mittheilungen' of the Hamburg Geographical Society, Dr. H. Lindemann throws some light on the physical geography of the island of Heligoland. He shows that the island is protected on the east from the action of the sea by a long and narrow sand-dune, about $1\frac{1}{2}$ mile distant. The gradual disappearance of Heligoland, Dr. Lindemann points out, is but partly due to the action of the sea. This is especially the case with the western side, where the strength of the waves is much greater. The chief factors in wearing down the island are the heavy rainfall, the variations in the weather, and the dissolving power of the frost; all these causes effect the disintegration of the stones and the denudation of the land. The results can be seen better at work on the eastern side of the island, for the strata and the inclination of the Oberland are towards the north-east, and all the water consequently flows that way. The eastern side is largely planted with potatoes, and the gradual disappearance of these potato fields gives us a tolerably good basis on which to calculate the wearing away of this side of the island. There is now nothing remaining of a potato-field which only eighty years ago measured 250 feet wide, and another field, 80 feet broad, has

been reduced within the same period to 10 feet. In old maps we find an ancient cemetery on the eastern side of the Oberland, which had to be removed to its present position. These causes, but, above all, the direction in which the strata lie, produce the different aspect of the eastern and western sides. The eastern cliff is mostly uniform and perpendicular; the western side offers a splendid and varied example of the invasive powers of the sea, with its many inlets, caverns, and chiselled pillars now separated from the main rock. From a comparison with the measurements taken in 1845, Lindemann finds that the western cliff has receded about seven feet in the last forty years, or at the rate of about two inches a year. The Unterland was joined to the dune by a stone jetty, called the Waal, as recently as the seventeenth century. This Waal formed a kind of semicircular harbour, open on the north and south sides. If we take Geern's map, we find the place of the old northern harbour occupied then by green pastures and meadows. But this has all been swept away; the sea carried most of the jetty towards the Unterland and the dune. The destruction of the breakwater had the effect upon the mainland that the Unterland, against which the masses of stone were driven, was gradually so greatly increased that new rows of houses could be built upon the beach.

Obituary.

Mr. W. G. Palgrave.—By the death of Mr. William Gifford Palgrave, the accomplished and adventurous traveller whose journey through Arabia in 1862-3 attracted such universal attention, our Society loses one of its most distinguished members. The event occurred at Montevideo, where he was serving as British Minister to the Republic of Uruguay. He was the second son of Sir Francis Palgrave, the famous historian and Deputy-Keeper of the Public Records, and was born in Westminster on January 24, 1826. Like his eldest brother Francis, he was educated at the Charterhouse, and left that school with all the honours which a schoolboy can gain on entering on a University career. He obtained a scholarship at Trinity College, Oxford, his eldest brother having already entered at Balliol. At the early age of twenty, after an academical residence of only two years and a half, he took his First Class in Classics, in which class are to be found in the same year other distinguished names, such as W. Bright, J. Conington, and W. Ince, while T. G. Baring, the present Lord Northbrook, was in the Second Class. Palgrave also gained in the same Honour Schools a Second Class in Mathematics. On leaving the University without seeking any further distinction, he entered the Army and served as a lieutenant in a regiment of Bombay Native Infantry. From childhood he had shown himself fearless and energetic in the first degree, far-thoughted and full of resource, and now, bringing into the Indian Service the fruits of an education more varied and complete (in the field of military mathematics especially) than, at that time at least, fell commonly to the lot of officers, and having inherited his father's instinct for language, a brilliant career was expected for him by his superiors. But an early passion for mission work among the Arab races, aroused by the translation of the old Arabian romance, *Antar*, now returned upon him with overmastering force.

Within a few years he quitted the Army, and was received into a house of the Jesuit Fathers in the Madras Presidency; this being the nearest accessible to him.

Whilst faithful throughout to family affections, and loyal to old friendships and memories with the strength of a strong nature, to the work of that Order he devotedly gave himself for about fifteen years; first in Southern India, then (for completion of the requisite studies) in Rome, until the dream of his boyhood was finally accomplished by his mission to Syria and Palestine. He now made himself master of Arabic habits of life, religion, literature, and language; not only preaching extempore to vast crowds (and the Arabian crowd is said to be critical in the niceties of their beautiful and copious tongue), but writing hymns which were sung through the country. Meanwhile the Druse persecution broke out, and had not the rules of his Order stringently forbidden it, he must, as he stated, have yielded to the urgent prayer of the Maronite Christians, and put himself at the head of their inexperienced forces;—just escaping with life from Damascus, after giving advice as to the defence of the city which the Maronite leaders feared to follow. As the Mission of Beyrout was broken up for the time, Palgrave determined to penetrate Arabia through its centre, with the object of ascertaining whether it would be ultimately possible to enter that sealed land as a Christian teacher. To aid him in this journey, with due allowance on the part of his religious superiors, he accepted a commission from the late Emperor Napoleon to report to him on various matters connected with Arabia, in which the Emperor was much interested. He had fulfilled his mission in 1863, when finding it hopeless to go on further with his object, he returned to Europe, quitting the Jesuits soon after. At one of our meetings, in February 1864, he delighted the Society with the account of his journey and adventures,* and in 1865 he published his 'Narrative of a Year's Journey through Central and Eastern Arabia,' one of the most interesting and romantic books of travel and adventure that has ever delighted the public.

Except for Dr. Wallin's journey across the country in 1848, and the less important one of Capt. Sadleir, nothing had been heard of the interior of the Arabian Peninsula in recent times, and there was a vague idea that the country was dominated by the fierce and intolerant Wahabis, and quite inaccessible to Europeans. Palgrave was thoroughly competent to pass as a Mahomedan; but no disguise of this nature was needed, and it was, in fact, in the character of a native Syrian doctor, about whose form of religion no one concerned himself, that he entered Arabia; the stress of danger in those parts, as he well knew, lying not in his faith, but in his European nationality. As has already been said, his familiarity with the language and habits was perfect, but nevertheless he carried his life in his hand, and he nearly lost it. He had penetrated as far as Haill when his fame as a learned stranger brought him a summons to Court. In the course of an interview with one of the Princes, he was recognised by two persons who had seen him in Damascus, and the success of his undertaking, if not his life, was in imminent peril. Palgrave managed to evade the suspicion for the time; but when he boldly went on into the interior of the peninsula, he had a still narrower escape at Riadh—the headquarters of the strictest and gloomiest Wahabi fanaticism—where the Prince Abd-allah discovered his real character and threatened him with assassination. He escaped this peril only by flight from the city, and passed without harm right through Arabia to the kingdom of Muscat, at the south-eastern corner of the country.

In 1865, Mr. Palgrave was employed on special work by the English Government, whose diplomatic service he now entered for the first time, in negotiating for the release of Consul Cameron and other prisoners in Abyssinia. From that time his

* 'Journal R.G.S.,' vol. xxxiv. p. 111, and 'Proceedings,' vol. viii. p. 63.

history is contained in the records of the diplomatic and foreign service of this country. He was successively appointed Consul at Soukhoum Kalé, 1866, Consul at Trebizond, 1867, at St. Thomas, 1873, at Manila, 1876, and Consul-General in Bulgaria in 1878. In March 1872, he favoured the Society by reading, at an evening meeting, a paper on the country between Trebizond and the Upper Euphrates, over which he had travelled during the period of his consulate at the former place, and in which he gave a vivid account of the Lazés, who were newly settled in the region. He was transferred to Bangkok in 1879, and in 1884 he was promoted to be Minister Resident and Consul-General to the Republic of Uruguay, in the capital of which State he has just died at his post. No details as to the immediate cause of his sudden and unexpected death have yet been announced. But a life so adventurous had severely tried his naturally strong vital powers, and the winters of Uruguay, cold to one who had passed many years in the tropics, may have favoured the development of acute rheumatic gout, to which he probably succumbed.

Besides the work which made him famous, he was also the author of 'Essays on Eastern Questions,' 1872; 'Hermann Agha, an Eastern Narrative,' 1872; 'Dutch Guiana,' 1876; and 'Ulysses,' a series of scenes in many lands, in 1887.

Ulysses, though the author had not this meaning in view, was indeed no ill-chosen name for one not only so wide a traveller, so quick an observer and vivid a painter of the *mores hominum multorum*, but whose versatility and mental acuteness led him also to be a keen and devoted student of the best literature of many nations. Besides his familiarity with the extensive poetical treasures of Arabia, he knew the 'Commedia' of Dante almost by heart; and English poetry of the highest order was constantly in his hands and on his lips. The lucid brilliancy of style remarked in his Arabian narrative, in fact, was due to these studies; he regained the purity of his native language, after many years spent almost wholly amongst foreigners, by a careful six months' preparatory work among the masterpieces of English literature. To his command over Asiatic languages he must also have been much indebted for the strong hold of loyalty and affection which he had throughout over the various native races amongst whom he was called to work, in a career which, we think, may correctly be described as adventurous, honourable, and useful, in no narrow measure. In whatever sphere of labour he found himself, intrepid devotedness to the duty before him was the abiding note of his character.

Mr. Palgrave became a Fellow of the Royal Geographical Society in 1878, and on his return to Europe after his journey through Arabia, he received the gold medal of the French Geographical Society.—Oct. 4th, 1888.

Mr. W. F. Donkin, and Mr. H. Fox.—On the 29th August Mr. W. F. Donkin, Hon. Sec. of the Alpine Club and the Photographic Society, and Mr. H. Fox left a camp at the head of the Doumala valley in the Bezingi district of the Central Caucasus to investigate the chain of Dycttau, accompanied by two Alpine guides, Kaspar Streich and Johann Fischer, both of Meiringen.

The whole party was lost on the mountains. Their friends in England heard nothing of the disaster until the last days of September. Instant communications were made to insure efficient search. Meantime Mr. Phillippes-Wolley, an experienced Caucasian traveller, had by accident arrived on the spot, and generously gave up his own plans in order to further a search, which has so far resulted only in the discovery of traces of the climbers' passage on the glacier above their camp (see plate in 'Alpine Journal,' No. 101). Nothing has been found to indicate the exact locality or the nature of the disaster which overtook them.

There are hazards on the mountains which no foresight can evade, even were human foresight infallible. Every form of exploration has dangers of its own, dangers which prudence and experience may reduce to a minimum, but which they cannot

annihilate. The special perils of the Caucasus for capable mountaineers are, according to my own experience, such as arise from sudden changes of weather, and the state of snow and frequency of avalanches produced by rapid variations of temperature. The ridges also are "corniced," or capped with overhanging eaves of snow, to an extraordinary extent. It is mere guesswork, but I incline to attribute my friends' disaster to some kind of avalanche. We know the weather was favourable at the time; and surely four such skilled climbers lost their lives by no failure of limb or head. Rather they were struck down of a sudden by the unforeseen treachery of some falling snowcliff, which now covers its victims under a white cairn of frozen blocks.

Mr. W. F. Donkin was the son of the late Savilian Professor of Astronomy at Oxford, and inherited from his father scientific tastes, and a rare musical talent. The father was brilliant as a scholar as well as profound as a mathematician, and the son combined the fine taste of an artist with the patience and accuracy of a scientific worker. Indefatigable and successful as lecturer on chemistry at St. George's Hospital, and in pursuing the practical developments of electric lighting, Mr. Donkin had made his leisure a source of pleasure and instruction to a large public. His chemical knowledge, his delicacy and patience as a manipulator, his sense of beauty and proportion in nature, made him technically one of the first of landscape photographers. His skill as a mountaineer enabled him to carry his camera to heights inaccessible to common men, to the pinnacles of the Weisshorn, the Aiguilles du Géant and Dru, to reproduce worthily for the first time on an adequate scale the features of the most secret recesses of the High Alps. Since Mr. Donkin, at his friends' urgent request, allowed his photographs to be sold, no lover of mountains, no teacher of physical science has needed any longer to be at a loss for a remembrance or an example of Alpine scenery or glacier action. What Londoner but has paused before a well-known window in the Strand to look up above the mud of the streets and the celebrities of the hour to the imposing frieze of great peaks and glaciers, to recognise or admire some fresh addition to Mr. Donkin's gallery of the giants of the Alps?

For our Society Mr. Donkin wrote the chapter on photography in the last edition of 'Hints for Travellers,' and at the last soirée he exhibited with a lantern many of his Swiss and Caucasian views. The day before he left England he completed at my request the original of the beautiful illustration to this number.

During his journey with Mr. C. Dent in the Caucasus, in 1886, he made a series of careful measurements of the great Bezingi Glacier, which were embodied in a map published in the 'Alpine Journal.' This year he went prepared with instruments to take various kinds of observations, in order to fill up some of the gaps in our knowledge of the Caucasian mountains. The last post-card I had from him, dated "Betscho, August 15th," gave the results of his boiling-point thermometer on the highest point he reached on Ushba—for he and his companions went in no foolhardy spirit; they turned back from their attempt on the Caucasian Matterhorn when they found the snow in bad condition.

This is not the place for an intimate portrait, or for any full expression of his friends' loss.

"Multis ille bonis flebilis occidit."

More lamented by none than by the few with whom his path in life had, since Eton and Oxford days, run more or less parallel, and who had known him for thirty years always the same, the least self-seeking and the most considerate of men, doing whatever he thought he ought to do, even when it involved work uncongenial to his retiring tastes, in a generous temper, and with a fine tact and modesty that must have won the heart of an enemy, had it been conceivable that he should have one.

Bright and eager in manner, he talked less than he listened, and in action was often deliberate to a degree that might have made his comrades impatient, had they not known that his delay arose chiefly from a fastidious reluctance to do a thing until he could see his way to do it perfectly. Delicate but vigorous in frame and in mind, he was the least pretending of mountaineers, the most gentle of men, the most loveable of friends. While his companions live his memory will live in their hearts. And for others his works will, we may hope, long endure as a memorial of the mountaineer who devoted himself to reveal to all men the most inaccessible splendours of the mountains—who took us up with him to the pure upper world where the clouds are so often spread beneath as a floor, while the white peaks shine under a vapourless vault—who was no unworthy priest of that temple of nature where he has now found his last resting-place.

Mr. H. Fox was a member of the well-known family of that name, resident at Wellington, Somerset, where he was engaged in business. He was one of those fine young English gentlemen who carry the same high spirit into work or play. A member of the county eleven, a leader of the football team, "Mr. Harry," as he was generally called, was the pride of his native town and county.

In the Alps he had served with distinction his apprenticeship in mountaineering. He was eager to explore mountains scientifically as much as to climb peaks. He took lessons of the Society's Scientific Instructor before he started for the Caucasus: he neglected, in short, nothing by which he could hope to make his journey profitable to others as well as to himself. He was thirty-two years of age, ten years younger than his companion.—[D. W. F.]

PROCEEDINGS OF THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIATION.

BATH MEETING, 1888.

(Concluded from p. 668.)

Friday, September 7th, 1888.

Explorations on the Chindwin River, Upper Burmah. By Colonel WOODTHORPE, R.E.—Will be published *in extenso*, with map, in a subsequent No. of the Proceedings.

A New Route from India to Tibet. By W. J. ELWES.—Will appear in a subsequent No.

Notes on the Geography of the Region from the Nile to the Euphrates, as known to the Ancient Egyptians. By the Rev. HENRY GEORGE TOMKINS.—Will be published in full in the 'Quarterly Statement of the Palestine Exploration Fund'; the following is a brief résumé of the paper:—

No route was so important in the most ancient times as the great drift-way from the Persian Gulf to the Nile Delta by way of the Orontes valley, Cœle-Syria, and Palestine, or of Damascus and across the Jordan. The Egyptians were the greatest of all the ancient geographers, and have preserved for us on a profuse scale their records. Narratives of conquest, tribute-lists, despatches and private letters, and many other memorials have come down as our materials; and none are more interesting than the *cuneiform* tablets lately found at Tel-el-Amarna in Upper Egypt. The results of examination are not yet fully available, but we are quickly filling up the map of all the country from the Egyptian eastern frontier to the banks

of the Euphrates for the ages before the conquest of Joshua. From the fortified border of the Delta three routes led eastwards and northward across the desert. 1. From Tanis (Zoan) by Pelusium along the coast. 2. From the Wādy Tumilat, the ancient road rediscovered by the Rev. F. W. Holland. 3. The way of the Red Sea, represented by the present Hajj road. The Etham of the Exodus was not any *Khetam*, but the Atima of the papyri, probably the el Adām mentioned by the Rev. Greville Chester between Pelusium and Daphnæ (Tahpanhes). Seti I. has given us his military route, with its fortified watering stations in the desert, to the stronghold of Kanāna south of Hebron. A very important place, besieged and taken after the expulsion of the Hyksôs by Aahmes the founder of the XVIII. dynasty, is Sharuhēn, now Tel-esh-Sheriāh, north-west of Beersheba. It used to be thought that the Egyptian armies avoided the mountain masses of Palestine, but a careful examination of the Karnak tribute-lists leads to a quite different conclusion. The coast route was deflected far inland by a dense and impracticable forest, haunted by brigands, between Joppa and Carmel, but the hill-country was brought under the military control of Egypt by the great kings of the eighteenth dynasty. The names of the tribute-lists are to a great extent identical with the Biblical names in the book of Joshua, &c., and many of them occur in Assyrian annals, and the greater part may be found, not greatly altered, as the present local names. Askalon, Joppa, Gaza, Megiddo, were Egyptian garrisons. The great fords of the Jordan were covered by military posts on the east side, and the great route down into Arabia was secured. Tabor and Merom and Laish were points of note. The fords of Jordan, and the Litāny (Nazana) are mentioned, and the Nahr-el-Kelb bears its own monumental testimony to the conquerors. The Lebanon supplied its cedar and pine timber to the Pharaohs, who had garrisons there. Along the southern Nahr-el-Kebīr (Eleutherus) a great route led to the Orontes and its fortress Kadesh in the land of the Amorites. The Orontes valley is full of names which we meet in Egyptian tribute-lists and narratives of campaigns, and several occur near Antioch and in the Taurus. The northern list of Thothmes III. furnishes 230 names, besides 119 in the Palestine list. Very careful examination now shows that at least 20 of the northern names are along the Euphrates, including Pethor (of Balaam), Karkemish, and Kirkesion, and three important fortified towns renowned in the Egyptian campaigns, Anukie (Annukas of Procopius, refortified by Justinian); Hurenkal; and Inā (perhaps Haragla or Herakleh and Einya, both on Euphrates). The land of Naharina extended east and west of Euphrates, as we learn from Egyptian texts, but in the cuneiform tablets of Tel-el-Amarna it is identified with the land of Mitāni between the Euphrates and the Khabūr river. These tablets show us that the Pharaohs Amenhotep III. and IV. (Khu-en-aten) were overlords of Assyria and Babylonia, and this agrees well with the principal places on both sides of the Euphrates being included in the tribute-list of Thothmes III. A list of Euphratean names will illustrate this, reaching from above Bir-ejik to some 100 miles below Kirkesion, including positions on the east side commanding great passages of the river. Further eastward it is not proposed to go in the present paper. But the inclusion of Damascus and other places on the great route across the Jordan near Beth-shan, and the old Hajj road towards Arabia, in the lists of Thothmes, is thoroughly congruous with such substantial conquest as we have now ascertained. This was the old line of march of Kedorla'omer in the days of Abraham, and in the list of Thothmes we find the same memorials in the Ono-rapha which preserves the name of the Rephaim, and Ashtaroth where these people were smitten, and perhaps Hum is the Ham (חם), where the Zuzim were likewise smitten by the old Elamite suzerain. Now the tables had been turned, and Egypt was lord of the Euphrates. The Egyptians, for all their appliances of easy life, were a very enterprising people,

and highly trained both as conquerors and administrators, and were continually forced to supply their needs from foreign lands and to defend themselves by keeping their enemies in order. These things help to account for the thorough knowledge which they had of the geography between their own Nile and the great river Euphrates, which we are able to ascertain by Biblical and Assyrian and classic records, and by the innumerable names still fresh on the lips of the inhabitants. The successful studies of Mariette, de Rougé, Brugsch, de Sauley, Maspero, Conder, and others should but stimulate us, both scholars and travellers, to more perfect methods and more exhaustive results.

Remarks on the Rev. Mr. Tomkins's Paper. By Major CONDER, R.E.—Will be published in full in the 'Quarterly Statement of the Palestine Exploration Fund.'

Recent Explorations East of the Jordan. By Captain A. M. MANTELL, R.E.—The portions of eastern Palestine which have been recently explored are three in number, viz. 500 square miles surveyed by Major Conder, R.E., to the north-east of the Dead Sea, and two portions of 450 and 240 square miles respectively near the Sea of Galilee, surveyed by Herr Schumacher. The principal points were fixed with the theodolite and a triangulation linked with that of western Palestine. Detail was filled in with the prismatic compass and altitudes of subsidiary points fixed by means of the aneroid barometer. At the same time information was collected as to the Arab tribes and their history, and ruins, dolmens, &c., were measured up and sketched. Some difficulty was experienced in ascertaining the names of places, but still more in spelling them with correct Arabic letters. About thirty Biblical sites have been recently recovered, including Mount Peor and Bamoth Baal. Some time was spent at Ammān, a city abounding in Roman ruins. The Mohammedan remains are less important, but include a Sassanian building which throws light on early Moslem architecture. Rabbath Ammon is now occupied by a colony of Circassians. Arāk el Emir and the ruined palace of Hyrcanus were also sketched and photographed. They were found to agree very well with Josephus's description. Several hundred dolmens were observed, plans and sections being taken of the best preserved; those in Moab seem to be sacrificial, not sepulchral. A number of menhirs were discovered, and plans were made of several large ancient stone enclosures. The latter are often imitated at the present day on a small scale. Tombs are surrounded by circular enclosures, at which the Bedowy prays and makes his offerings. Two groups of the stone pillars called "Serābit" and several disc stones were also found. Herr Schumacher's work in the Jaulān and Haurān was executed while surveying the country for a railroad to Damascus. He has drawn up geographical gazetteers of the various districts. Through his work the ancient Kohaba has been discovered. He has also fully described some of the underground cities. In addition to the above he has surveyed and written a pamphlet on the ancient Pella. Herr Schumacher has examined numerous dolmens, and come to the conclusion that they are sepulchral in their origin. A large part of eastern Palestine still remains to be surveyed; a work which ought to be carried out at the first opportunity.

Jerusalem: Nehemiah's Wall and the Royal Sepulchres. By GEORGE ST. CLAIR, F.G.S.

Monday, September 10th, 1888.

On the Condition of Tunis since the French Protectorate. By Sir R. LAMBERT PLAYFAIR, K.C.M.G.—Last winter I took occasion to address a report to H.M. Government, which has been laid before Parliament, giving an account of the

progress of the colony, and of the various experiments in government and colonisation which have been made since the conquest. I ventured to style the great, though costly results which have been attained, "Colonisation de luxe," and I wish now to give an idea of the result of government in Tunisia, carried on in a totally different manner, where State assistance is unknown, where not a single village has been created, not an immigrant imported, not an acre of Arab land confiscated, and where the whole civil charges borne by France do not exceed 6000*l.* a year. The machinery of government is of the simplest description; the Minister-Resident is the representative of France and Foreign Minister of the Bey, he is assisted by a small staff of French functionaries; indeed, the whole number of French officials, corresponding to what we should describe as "heads of departments," hardly exceeds a score.

There is a strong feeling in Tunis regarding the maintenance of its independence, at least, as regards Algeria. Annexation would entail burdens which the country is ill able to afford; but this feeling does not find much favour beyond the regency itself, and there is a party, both in Algeria and in France, clamorous for complete annexation, jealous of the supposed designs of other countries, and anxious to make the whole of North Africa a continuation of the mother-country.

This is the age for industrial exhibitions, and one has just been held at Tunis which, in spite of the very short time occupied in its organisation, may fairly be considered as a success. Great efforts were made to bring together the products of the country, and to collect, for the instruction of the Tunisians, the most improved agricultural and industrial implements from Europe.

European civilisation has made, as it was bound to do, great changes in a very few years. It is not very long since I made a journey of several hundred miles in the interior; there was then hardly a European in any part of it; not a mile of road existed in the whole land; the appearance of a traveller was an unwonted sight anywhere, and in some places which I visited it was absolutely unprecedented. Now Tunisia is something like a French colony, its seaports are flourishing, European enterprise is opening it up in every direction; if roads are still somewhat conspicuous by their absence, this will soon cease to be the case, the traveller will at least find nothing to interfere with his progress; accommodation may be rough, but security he will find everywhere.

The most important work performed by the jury of the Exhibition was to award prizes for the best European farms; these are numerous and large, principally owned by French, but there are two belonging to British subjects, which were honourably mentioned. One of these, the third in order of merit, is that of our countryman, Mr. Pilter, well known as the introducer of agricultural machinery of the best description into North Africa. He has purchased an estate of upwards of 8000 acres, of which one-tenth has been brought into a state of high cultivation; his vineyard particularly attracted the attention of the jurors, and his wine was rewarded with a gold medal.

It is surprising how much has been done in the way of creating important agricultural establishments. Three years ago the interior was still almost a *terra incognita*; the land was uncleared, or cultivated only in the most primitive manner by the Arabs. Now it promises soon to rival Algeria as a wine-producing country, and for the rearing of cattle and horses.

North Africa does not seem to me to have any great future as regards ordinary agriculture. The increasing competition of India and America is such that cereals can no longer be cultivated, by Europeans at least, with any prospect of success. Even in favourable years they are unremunerative, and in Tunis favourable years are the exception rather than the rule. The present season promises to be one of famine from drought and the invasion of locusts. Some idea of the insufficiency of

the rainfall may be obtained from the state of the great aqueduct which formerly conveyed the water of the *Zeugitana regio* to Carthage, and which still supplies Tunis. A year ago 18,000 cubic metres of water flowed in the pipes daily, and a surplus of 20,000 cubic metres was diverted at the fountain-head. Last winter not more than 7000 cubic metres left the spring, and I hardly dare to think what the volume must be now that the heats of summer have arrived.

But the vine appears to resist almost any amount of drought, and to flourish on any kind of soil. Land suitable for it has been purchased at from 5s. to 25s. per acre; the cost of clearing and planting it seems to have been less than in Algeria, varying from 5l. to 7l. per acre. Several very large plantations have already been made; one French colonist has 1000 acres, another has 500, and the domain of the Enfida has 600. These figures imply a very large amount of capital sunk in the land and invested in the construction of cellars and plant of an expensive character, but the profits which may be expected are as considerable, certainly more than 10 per cent.

Sometimes the difficulties that have to be encountered are of a very serious nature, such as the encroachment of sand, blown up by prevailing winds from the sea-shore or from other sandy tracts. I noticed this extraordinary phenomenon during my journey in 1876, in the country east of Tabarca. No uncertain line of demarcation existed between the sand and the rich forest land beyond; it ended abruptly in a bank, sometimes rising like a cliff 30 feet high, sometimes invading a valley like a glacier, but always advancing and swallowing up vegetation in its course. To contend successfully, as has been done, against such a natural force as this requires no small amount of energy and intelligence.

In addition to vines the only other products of Tunisia in which any marked progress is perceptible, or from which any hope for the future can be entertained, are olives, dates, and live stock. I do not propose to trouble you with any statistical details on these subjects, but you may like to hear an estimate of the amount of live stock of all kinds that is supposed to exist in the regency. The numbers are, I think, somewhat exaggerated; they are:—

Horses	..	..	..	..	..	..	100,000
Asses	..	..	..	..	..	..	300,000
Cattle	..	..	..	..	..	..	3,000,000
Sheep	..	..	..	..	..	..	20,000,000
Goats	..	..	..	..	..	..	5,000,000
Camels	..	..	..	..	..	..	200,000

It is only in agriculture that I can report any considerable improvement. The native industries are few and in decadence. Pottery is made at Nabeul, possessing a beautiful green and yellow glaze, and of elegant form—the tradition, no doubt, of Roman art. Red caps are made at Zaghouan, and are highly prized in all Mohammedan countries. The exquisite Moorish tiles, for which Tunis was once so celebrated, may almost be considered as a lost art; the same may be said regarding the wonderful plaster geometric tracery, far more beautiful than any to be seen in the Alhambra. The carpets of Kerouan and the *haïks* of Djerba are still celebrated, and almost every man in Tunis wears a garment, or *djoubba*, which, for beauty of texture, embroidery, and harmony of colour, cannot be surpassed. Hitherto, the demon of coal tar has not reached Tunis, and the natives have not, as in Algeria, commenced to use aniline colours instead of their own beautiful but more costly dyes.

Commerce has also increased in a notable manner, but this is a subject on which I do not propose to enter. I will only say that, during the five years which preceded

the occupation, the imports were estimated at 54½ millions of francs, and the exports at 58 millions. During the five years after the occupation they had reached 118 and 86½ millions respectively.

I do not suppose that the French have any secret in colonisation which is denied to others; one of the causes of their sudden success may be that the nations of Europe have frankly admitted the situation that has been created in Tunisia, and their agents, far from throwing obstacles or difficulties in the way, have cordially done all that lies in their power to facilitate their task, in the fullest confidence that the best interests of natives, French, and foreigners alike, are bound up in the steady development and prosperity of the country.

France has shown herself a beneficent protector of the regency; I venture to think that the nations of Europe have shown her how a great nation ought to be treated when it undertakes the difficult task of regenerating a semi-barbarous country.

The Commercial Future of Central Africa. By Sir FRANCIS DE WINTON. —I purpose saying a few words upon the most recent undertakings having for their object the commercial civilisation of Central Africa, viz. the German East African Company and the Imperial British East Africa Company; or I shall rather follow the history of the latter, because these two important associations are commencing on what may be termed almost identical lines, and therefore the history of one is the history of the other; it will be an interesting study to watch their respective developments.

In 1886, soon after the Conference at Berlin, a convention was entered into by Great Britain and Germany, by which a certain portion of East Central Africa was divided between them. The limits of this territory are as follows:—

Starting from the Rovuma river on the south, it follows the coast-line, passing Zanzibar, to the north as far as the Tana river. From this point it follows the course of the river or its tributaries to the intersection of the Equator and the 38° of east longitude. The dividing line between the respective areas of each country commences at the river Wanga or Umbe, from thence it takes a direct line to Lake Jipe, and passing round the eastern shore of the lake it skirts the northern base of the Kilimanjaro Mountains, dividing the territories of the "Ohaga" and "Taveta" tribes; from whence it takes a direct line to a point on the shores of the Lake Victoria Nyanza, where the lake is crossed by the 1° of south latitude.

The coast-line of the above-mentioned territory may be roughly estimated at 550 miles, of which the Germans, by this agreement, have obtained about 400 miles, while the British Government only secured 150 miles.

At the time of this agreement it was further covenanted by the two Governments and the Sultan of Zanzibar, that the territory belonging to the Sultan should comprise a belt or fringe along the coast, extending 10 miles inland, and commencing from the river Minengani, at the head of Tungi Bay, on the south, to Kipini on the north.

Now it is obvious on looking at a map that the respective areas of British and German influence by this arrangement, though they possessed large and important tracts in the interior, were cut off from communication with the ocean, for all the ports would belong to the Sultan of Zanzibar. It therefore became necessary to enter into a further agreement with the Sultan. In 1878, Mr. William Mackinnon, the chairman of the British India S.S. Company, was offered by the late Sultan, Sayid Bargash, a concession of all the customs of Zanzibar on certain conditions. These conditions being favourable, he was prepared to accept the offer, but the Government of the day refused its support to the scheme, and Mr. Mackinnon, not feeling justified in accepting the responsibility which would be incurred without the support of Her Majesty's Government, declined the negotiation. The amount of customs revenue at that time was estimated at about 60,000*l.* a year.

On the conclusion of the agreement between Great Britain and Germany, Mr. Mackinnon, whose enterprise and energy have made themselves widely felt, not only throughout our great Indian dependencies, but also in the Straits and Australia, again entered into negotiation with the late Sultan, having ascertained that the Government were favourable to the idea, with the result that he obtained the coast-line from the Umba or Wanga river to Kipini, under the following conditions:—

The government of the coast from Wanga to Kipini inclusive, with the collection and administration of the customs at Mombasa and the other ports situated in that section of the coast, subject to the recognition of the Sultan's sovereign rights and the annual payment to him of a certain agreed amount of the custom revenues; also full authority to act in all departments of administration and government; to appoint judges, officers, and to dispose of public lands; to make laws; to impose and collect dues and taxes; to conclude treaties with native chiefs; to regulate trade and commerce; work mines; establish banks; and, generally, to enjoy all the rights of sovereignty possessed by the Sultan himself, and to exercise the same in conformity with His Highness's treaty-obligations with other countries.

It need not be pointed out, further, that the great importance of this concession lies in the fact that it connects the vast inland tract directly subject to British influence with the sea-coast and the ports from which it had been before shut out. Under the auspices of the German Government, a German company subsequently entered into a convention with the Sultan on identical lines to those of the one concluded with Mr. Mackinnon, by which they obtained the concession of the 10 mile belt south of the Umba river as far as the Rovuma river.

This action was followed by the formation of a syndicate composed of Mr. Mackinnon's friends, and those connected with him in business; a sum of 250,000*l.* was raised privately among them for the purpose of taking over the administration of the conceded territory, and of developing the area of British influence; and the following Court of Directors were chosen from among the subscribers:—Mr. W. Mackinnon, president; Lord Brassey, vice-president; General Sir Donald Stewart; Sir Thomas Fowell Buxton; Sir John Kirk; General Sir Arnold Kemball; General Sir Lewis Pelly; Colonel Sir F. de Winton; Mr. Burdett Coutts; Mr. A. L. Bruce; Mr. R. P. Harding; Mr. G. S. Mackenzie; Mr. Robert Ryrie; and Mr. J. F. Hutton.

As the prospects of any company or enterprise depend greatly upon those who conduct its affairs, it was a matter of great importance to launch this enterprise with men of experience and ability; and I think it would be difficult to find a more capable body of men than those whose names I have just read to you, as among them will be found men who possess great business capacities, great experience in administration, and an extensive and accurate knowledge of the peoples and country whom they will in the future have to control. They are, therefore, well qualified to administer the important trusts committed to their charge, not only as regards the development of trade and commerce, but also in regard to the throne and dynasty of Zanzibar, with whom they will establish friendly relations, and so give strength and permanency to the present Sultan.

These preliminary arrangements being concluded, an application was made for the incorporation of the Company under a Royal charter, in order that it should receive the sanction and approval of Her Majesty's Government.

This charter, similar in its terms and conditions to the charters granted to the Niger and Borneo Companies, received Her Majesty's signature last week; and the Imperial British East Africa Company, with its motto of Light and Liberty, is the latest offspring of that union of commerce and adventure which has raised Great Britain to her present eminence, at the head of the commercial nations of the world.

If I do not say much about the terms of the charter, it is because my time is limited, and I have yet a good deal of ground to travel over.

Now as regards the territories which comprise this most important acquisition for British commerce and British industries. I approach this portion of my paper with some diffidence, for I have never been in that part of Africa, and there are gentlemen present who have a personal knowledge of the country, but I believe I am correct in stating that for the first 80 miles after leaving the coast, the country is somewhat dry and arid, and sparsely populated. This latter circumstance is partly due to the raids of the Masai. As regards the water supply of this region, Consul Holmwood reports, wherever the underlying strata were exposed horizontally, and not much broken, that natural reservoirs were found in the form of circular holes or basins scooped out of the rock. The native name for these reservoirs is Ulungula, and the tribe which inhabits this region are called the Walungulus, and they find water in these, nature's, tanks all the year-round.

After passing Maungo, which may be said to be part of the Bura or Ndara range, the land rises, and you enter the Teita country, and soon pass into the rich and fertile districts which form the foot-hills of the Kilima-njaro mountain. After leaving this region, the rolling uplands of the Masai country are reached. These uplands vary from 3000 to 6000 feet, and support vast herds of cattle and many donkeys, also game in great numbers and variety. The climate is healthy, and well adapted to Europeans. At about 450 miles from Mombasa you come to the Lakes or Naivasha, Elmeteita, and Nakuro. They are all in Masai territory.

Lying some 30 miles to the eastward are the Aberdare range of mountains, named by Mr. J. Thomson, after the noble President of the R.G.S. of the year when he made his celebrated journey through Masai-land. The height of this range has been computed at 14,000 feet, and the lakes I have just mentioned lie in the broad trough which divides its rocky heights from what Mr. Thomson calls the Mau escarpment.

To the eastward again of the Aberdare Mountains, the great mountain Kenia, or the Donyo Egeré of the Masai, said to be 19,000 feet in height, rears its giant form; while to the westward of Lake Nakuro lies the Victoria Nyanza, not more than 100 miles away.

Pursuing a N.W. course, in another 100 miles Lake Baringo is reached, the overbearing and turbulent Masai are left behind, and the traveller finds himself surrounded by a peaceful population, lovely scenery, and a paradise for sportsmen.

Here a large trading station will be formed, as it is anticipated that the markets of the surrounding districts will afford a wide and valuable field for commercial operations, especially for the supply of cotton, and other manufactured goods never before introduced, in consequence of the exclusion of the inland population from the sea-coast.

From Lake Baringo a route can, without much difficulty, it is believed, be opened up to Emin's province, and Emin would probably advance from his end *visâ* Lenago and thus the intervening space would be rapidly bridged over, and, by keeping clear of the Uganda territory, a safe and secure route would be formed from the Albert Nyanza to the east coast. North and east of Lake Baringo lie Lake Samburu, and other untrodden wilds, offering a virgin field to the enterprising trader.

This brief and imperfect sketch it must be remembered is of a territory imperfectly known, and I therefore ask your indulgence, but it will serve to shadow out the probable lines on which the company will commence its operations and develop the resources of the territory over which it is about to rule. These resources comprise ivory, indiarubber, hides, copal and other gums, bees-wax, oil seeds, orchilla, &c.; and the climate and soil are capable of producing tea, cocoa,

tobacco, peppers, maize, sorghum, hill rice, vanilla, spice, coffee, and other sub-tropical products.

The company have also, in Mombasa, one of the finest harbours on the east coast, and in the territory ceded by the Sultan is to be found a semi-civilised population, accustomed to the payments of taxes and customs-dues. The population of Mombasa numbers about 15,000 souls, amongst which are a well-organised staff of British-Indian subjects, familiar with the collection of customs-dues. Thus the company will start under more favourable auspices than the Niger or Borneo companies, having a customs revenue, which they hope largely to develop, already in existence.

Mr. G. S. Mackenzie, one of the Court of Directors, who has had large and varied experience in the East, leaves England this week with a selected staff of assistants for Zanzibar. On his arrival at Mombasa he will take over the ports between the river Wanga and Kipini, at which customs are collected; and he will further despatch a large caravan, now being organised, into the interior. This caravan is to proceed to Lake Baringo, where a strongly fortified station will be formed, and from which trading parties will be despatched towards the north, east, and west. Efforts will also be made to conciliate the Masai with the view of bringing them under the control of the company. Some difficulties may be experienced at first in dealing with this people on account of their warlike propensities and marauding habits, and the terror they have inspired among the tribes in their vicinity. They are, however, a pastoral people, possessing large herds of cattle and donkeys, and are, therefore, vulnerable to any organised system which would deprive them of their most valued possession; and, though of common origin, they are split up into tribal communities, choosing their own leaders—for they have no permanent chief—under whose guidance they raid their neighbour's territories and carry off his cattle. The presence of cattle throughout this country is a proof of the absence of the tsetse fly, one of the greatest obstacles to progress in the regions to the south, where it is frequently met with.

Such is a brief account of this latest effort of British enterprise and capital. The history of our nation tells us what these dual forces have accomplished in the past; indeed, they form some of the brightest pages in our national records, and what has been accomplished before can be done again; for I do not believe in the decay of British energy, or that as a nation we have lost the wisdom, the courage, the sagacity, which, under God's blessing, has effected so many changes on the face of the earth.

That this enterprise is suddenly to turn, as with an enchanter's wand, the country of its operations, into a well-ordered state, is not dreamt of by its promoters. They have carefully weighed and considered the many difficulties which will have to be encountered; they desire to move steadily and slowly towards the great, and, if I may so term it, the enviable work they have undertaken. They fully acknowledge the trust and obligations which they are about to incur; but they are confident, as their enterprise advances and law and order are established, that trade and progress will develop; that further and wider fields for the salutary and civilising operations of the missionary will be opened up; that the curse of slavery will be removed; and that under all these influences it is but a question of time when the darkness and obscurity, shall flee away before the dawning lights of Christianity and civilisation.

Bechuanaland and the Land of Ophir. By Rev. JOHN MACKENZIE.*
(*Abridgment.*)—The majority of the native inhabitants of Africa, south of the

* Author of 'Austral Africa: Losing it, or Ruling it.'

Zambesi, belong to the Bantu family ; the bushmen are the only representatives of the Garipeine people within its boundaries. The Bechuanas are a wiry, vigorous race, capable of undergoing great hardship. I shall not enter upon their methods of government, or describe at length their religion or superstition. They were ancestor-worshippers and believers in the efficacy of charms, some of which obtain their supposed virtue from their priests. Their religious observances were practised on the heights and in groves, as well as in their villages. On special occasions a child was demanded by the priests, as parts of its body were necessary to ensure the success of their spells. The year was divided by a regular succession of observances of a religious character, but it would be impossible to separate tribal polity and religious observance. Christianity has gained considerable ascendancy through Bechuanaland ; but the Matebele, as a people, have hitherto kept back from professing adhesion to it ; although their warlike and cruel ways have been considerably modified by the intercourse of the tribe with missionaries and other Europeans during the last thirty years. The Matebele recruited their numbers from among the Basuto and Bechuana, and more recently from the Makalaka and the Mashona tribes. The Zulu tongue, which the Matebele spoke in Natal early in the century, and which they still understand, has been somewhat modified in their advance northwards by the incorporation of members of subject tribes. Bechuanaland was never conquered or held by the Matebele ; and the Bamangwato tribe, over which Khame is the present chief, refused from the first to pay tribute to the Matebele, and have exercised independence as a tribe ever since the Matebele passed northward into their present country.

The Makalaka and Mashona are the most industrious and the furthest advanced in agriculture and in rude arts of all the South African tribes. It is sad that they should have suffered most from the inroad of the Matebele. The Makalaka, or Banyai, are now found in greatest numbers as refugees under Khame, at Shoshong. The Mashona still manage to keep up a precarious existence to the east and north-east of Matebeleland, subject to repeated incursions from the Matebele. The country between these tribes is now a desert ; and that desert is a gold-field, which may be found to be one of the richest in the world.

The paucity of inhabitants, and the wideness of the unoccupied country, enter into all the thoughts and computations of South African people in a way unknown to the inhabitants of Europe. A European nation takes measures to defend itself—fights for its independence ; and if it fails, it has to submit to the terms of the conqueror who may occupy and govern the conquered territory ; but a different course is open to Africans—and is always present to their minds—they can move elsewhere in the wide and all but trackless expanses of beautiful territory. Thus Europeans found the most powerful and warlike tribes inhabiting the richest regions on the sides of the great watershed. On its western slope, Zulus and the Kaffirs were followed by the Basutos and Bechuanas, who speak a common language and are one people. Travelling westward still, as the country possesses fewer fountains and running streams, we find the tribes decrease in power, until we reach, in the Kalahari, the scattered and parted remnants of tribes, glad to find there a resting-place from their enemies, even if that rest is obtained at the price of tribute paid to their Bechuana masters. Water is often scarce in Bechuanaland and elsewhere in South Africa ; but to the native mind there never existed any difficulty about land. If his garden-plot did not please him, on consultation with his chief, he might dig elsewhere. If his grazing land did not cause his stock to prosper and increase, there was usually little difficulty in establishing another cattle post.

When I went to South Africa in 1858, there was no country known by the name of Bechuanaland. The country, of course, was there, and the Bechuana people

were there; but the name "Bechuanaland" expresses a political fact which had no existence at that time. The country was known only by the tribal names of its people—as the country of the Batlaping, the Barolong, the Bakwena, or the Bamangwato. Bechuanaland became known to us only a few years ago, as a country the independent chiefs of which were united in their desire to come under the protection and administration of England, and thus save themselves, as they hoped, from the uncertainties attending the advance of the energetic and sometimes reckless white man.

Between the Cape Colony on the south and the Molopo river on the north, we have, first, the Crown colony of Bechuanaland. Then to the west of the Molopo, as far as the 20th degree of longitude, and to the north, at first, as far as the 22nd degree of latitude, but now, by the recent announcement of Her Majesty's Government, as far as the river Zambesi, we have the Bechuana Protectorate. This Crown colony and protectorate is at present governed by an Administration, and by District Magistrates, and an Assistant Commissioner; and peace is, or ought to be, upheld in both colony and protectorate by a force called the Bechuanaland Police.

The open grassy plains of South Bechuanaland are drained by tributaries of the Vaal river on the east, and by tributaries of the Molapo on the north and west. The lovely country near Kanye and Molopolole is drained by the Notwani, which in turn joins the Limpopo river. The rivers of North Bechuanaland and Matabeleland, although flowing only part of the year, usually contain good water all the year round, which is easily obtained by digging a little distance into the sand. The zebras and other game might be seen coming down to the river-bed, and scooping out a small hollow with their hoof, quenching their thirst with the delightfully cool water. The Nata river in the north and the Botletli river on the north-west lose themselves in the salt-pan region, or Makari-kari. Beyond the Shasha the streamlets seek the north-going rivers which feed the Zambesi. The scenery of Bechuanaland improves as the traveller goes north. It is only in the best parts of the Cape Colony that he sees anything to compare, as to natural beauty, with the country near Kanye and Molopolole. The forests of acacia in South Bechuanaland have been well nigh cut down to supply with fuel the engines connected with the diamond industry at Kimberley. The country beyond Kanye to the north and north-east may be said to be well-wooded, even to denseness near the river-courses; while to the N.N.W. there are (as formerly in South Bechuanaland) vast open plains with occasional forests on the banks of rivers and at the foot of hills. The Botletli river and Lake Ngami or Ngabi region is very well wooded—the forests including the mighty baobab, and also the banyan tree, locally named *More-aa-maoto* = tree with legs. To the west, in what is known as the Kalahari Desert, there are dense forests extending over large tracts, thus pointing to the existence of abundant underground water.

There are numerous hills, but no high mountains in the country which I am describing; but the country itself is an immense elevated plateau, being at its highest about 5000 feet above the sea-level, as at Kuruman at the extreme south, and Hope Fountain on the north-east. At its lowest, in the Ngami region, it is over 2000 feet above the sea-level. With reference to the climate of Bechuanaland. In a dry year it is unpleasantly hot before the rains fall in spring. When in autumn the fruits of the earth are ripening, the leaves falling, and pools and river-courses are drying up, the heat of the sun is again felt unpleasantly; and spring and autumn are the unhealthiest seasons. But taking the year as a whole, there is no more healthy country for Europeans than Bechuanaland. This statement, however, requires qualification as the traveller approaches the great river systems. The banks of the Zambesi, of the Botletli, and Mababi, and the lower regions of Mashonaland, are

subject to malarious fever, especially at the seasons of the year which I have mentioned. But the hunter in Mashonaland has usually been able to recover health and strength without leaving the country. It has been customary for these men to repair to one of the mission stations; and there at an altitude of 5000 feet, and in a climate from which in winter the cattle have to be removed to a lower and milder region on account of the great cold, and assisted by the kindly offices of the mission family, the European has soon found his strength return.

Among the agricultural products of Bechuanaland in native hands, were different kinds of millet, "sweet-reed" (a kind of sugar-cane), several kinds of pumpkins, vegetable marrow and water-melons, as also beans, vetches, and ground-nuts. Rice and cotton are grown in the low-lying parts of Mashonaland. Their spinning and weaving implements remind one of old Egyptian sculptures. Till recent times, when the plough has displaced the native hoe, the Bechuana women were the field-workers. The Makalaka and Mashona were the most advanced agriculturists; and among them the men worked in the gardens as well as the women; and every child in the family had a patch under cultivation, which it was taught to look after, and to be proud of, from its earliest years. Irrigation, so necessary throughout the whole of this country, was unknown to the natives. The nearest approach to it was made by the Makalaka gardeners, who made transverse trenches in their gardens, with the object of retaining the rain-water, which might otherwise run off the garden. Tobacco, which is a plant introduced into Bechuanaland at a comparatively recent period, was watered by hand very diligently by its native owner. With irrigation and European skill, there is hardly a fruit or grain of a temperate or sub-tropical climate which cannot be grown successfully in Bechuanaland.

The Bechuana were rich in cattle and sheep and goats. Well-sinking, as in Australia, may be said to be still almost unknown in South Africa. Its value has been exemplified in the experiences of the diamond-diggers, who sank wells and obtained water in the dry country on which the town of Kimberley now stands. As a cattle-ranching country Bechuanaland—north and south—will be found to be excellent in almost every part; while in places where irrigation of land is practicable agricultural farming can be carried on with every prospect of success. It is thus a country capable of bearing a large population. The annual rainfall, most years would be sufficient, if the water were only kept for use in the country where it falls, by reservoirs and dams; to this has to be added the water to be obtained by well-sinking as practised in Australia. When higher farming is followed, and fencing becomes necessary, it will be found that nature has provided for the farmer in Bechuanaland a rich supply of the finest bushes for hedges which are to be found anywhere; bushes, however, which scattered over the country, now often annoy the traveller, whether on foot or on horseback, with their sharp thorns.

There is what may be called a plantation-belt of rich land lying between the range of mountains running parallel with the Indian Ocean and the coast of South-East Africa. In Natal this belt is under cultivation: opposite Delagoa Bay it is as yet undrained and unworked, and is a deadly and pestiferous region: in Mashonaland it yields rice and cotton to the native workers, as well as the other fruits already mentioned.

Iron ore is found in different parts of Bechuanaland. The process of smelting by means of charcoal was known to the natives long before their contact with Europeans from the south, and was no doubt part of the civilisation which they had possessed for centuries. Some of the tribes showed considerable skill in the making of their simple implements of peace and of war. I have said that the ironworkers had made some progress in discovery: they knew that the quality of the iron was changed by the length of the period of its contact with charcoal. The ironworkers

were practically a close guild, the business was hereditary. The sanctions of superstitution were called in to aid the monopoly: it was declared to be an "uncanny" and dangerous thing for a common person even to approach the smelting furnaces.

Mashonaland is valuable for more than its rich agricultural capabilities. From the northern border of Mashonaland, south-west to Tati, and south-east to Zimbabwe, there are numerous gold-bearing quartz reefs; while alluvial gold is found in many of the sand rivers. This gold was discovered at several widely separated places by Europeans in 1866—a discovery which was temporarily eclipsed by the finding of diamonds, and latterly of the gold of the Transvaal. One of the most interesting facts connected with this auriferous region is that, although the existence of gold in it had long passed out of the knowledge of the outside world, these mines had undoubtedly been worked at a remote period in the world's history. The country west of Sofala, bounded on the north by the Zambezi, on the south by the Limpopo, contains a field of the richest interest, not merely to the geographer and the geologist, but also to the archæologist. Up to the present time the country has not been thoroughly explored.

The explorations of this auriferous region which have taken place, have brought to our knowledge the existence, not only of virgin reefs, but also of old "workings" or mines, at widely distant points in the country; and those old workings are marked by certain well-built stone erections used by the ancient miners. Found as far west as Tati and Impakwe and the north bank of the Limpopo near Selikar, these buildings are in the best state of preservation nearer the sea-coast. The ruins at Zimbabwe or Mazimbae (lat. $20^{\circ} 15' S.$, long. $31^{\circ} 57' E.$) have not been fully examined, but enough has been brought to our knowledge, by Herr Mauch and by Mr. Thomas Baines, to show that great skill and industry had been exercised in the dressing of the stones, and in the erection of these structures. The ruins are extensive, covering part of a gentle slope, while upon a granite hill stands what was apparently a fort. It lies about 160 miles west of Sofala.*

We do not know what brought this ancient industry and traffic to so complete a termination that the very knowledge of the mines and of the mining had passed away from men's minds, and the inhabitants of the districts have not the faintest suggestion to offer.

Before concluding my remarks I will again refer to the recent announcement of Her Majesty's Government, which places this fairest and richest of all the parts of South Africa under the protection of Great Britain.

The understanding regarding Africa, come to in a friendly manner between European Powers, cannot be said to be completed, or to be final, until it has secured the approval and sanction of the native chiefs and tribes, and is carried into practice on the ground. It is one thing to hurry over a wide region, exhibiting a European flag wherever you go, and afterwards constructing a map of the territory traversed—which, by this easy process, is supposed to pass under the influence or protection of the country to which the traveller belongs. It is quite another thing for a European Power, by the protracted and friendly contact of its subjects with the native people of a country, to obtain so much of their confidence and their esteem that they invite that Power to enter their territory as a protecting, controlling, and governing power and offer themselves as subjects, and the unoccupied land of their country as the possession of England—with the one simple and affecting proviso that they themselves are protected by the Queen's Government, in their holdings. This gratifying

* For further information, *vide* 'The Gold Regions of South-eastern Africa,' by T. Baines. 'Austral Africa,' vol. i. pp. 33-48.

mark of confidence was recently shown by the Chiefs of Bechuanaland, and notably by the Chief Khame, towards Her Majesty's Government. This, however, was not obtained by the hurried march of a traveller with a flag in his hand, but was the result of patient and friendly intercourse between British subjects and Bechuanaland for two generations.

The country was first described by Englishmen. Its waggon-roads were made by Englishmen's waggons. Livingstone's was the first road to Lake Ngami and the Zambesi; Moffat's was the first, and is still the only fully opened road to the Matebele. From Kuruman in the south, to distant Inyati, Mababi, and Linyanti in the north, the traveller meets with these silent but eloquent testimonies as to what has been paid for the opening up of the country in the graves of the pioneers—the resting places of strong men, of gentle brave ladies, their true helpmeets, and those smaller mounds which tell the touching story of family bereavement endured by the solitary workers, so far from their own kindred. The men who lie there, and their successors now in the field, never used their influence with chiefs and people to obtain land for themselves. Their landed possession in the country of their adoption is the grave in which they, or their children, lie.

I shall not enlarge upon the value or the success of their teaching. What I wish to bring before your notice is the remarkable fact that these men, themselves totally unconnected with the English Government, so lived and so taught in Bechuanaland, as that the natives, chiefs and people, formally preferred the request that their country might come under the permanent control and government of the Queen. Other European powers, in view of such friendly contact between these African tribes and England, extending over so long a period of time, must feel that this region is justly, in the language of the recent official announcement, "solely the sphere of British influence."

It is, no doubt, true that such countries as the one I am describing invariably attract a population of the most energetic of our fellow-countrymen, who, somehow, find their way thither. But the facts which I have mentioned should, I think, be of some importance to those who are interesting themselves in the great questions of the distribution of our population and of colonisation. And those who think that this pressing subject will soon force itself into practical attention, and eventually become a fraction of our English Imperial Administration, can, at least, point to the great success and the permanent beneficial results, political and otherwise, which followed from the introduction by Government of the English and Scottish settlers to the eastern province of the Cape Colony some 60 years ago. Their descendants are, to-day, most intelligent, prosperous, and reliable subjects of the Queen. I fail to see why such action should not be repeated by Her Majesty's Government, and pastoral and agricultural farmers introduced on the easiest terms to what are now waste lands beyond the Cape Colony.

In such circumstances, is it right that Her Majesty's Government should content itself with a mere diplomatic announcement for the information of other European powers—an announcement which cannot be expected to be heeded by the persistent stream of Europeans going northward in Bechuanaland. These men are not disorderly or criminal to begin with, but when stopped by Imperial police and refused the guidance and control of Imperial Commissioners, organise themselves into filibustering forces and point their guns at those identical natives, chiefs and peoples, who have offered themselves and their country to the Queen of England. Why must there be a period of anarchy and outrage in a country declared to be under the protection of Her Majesty's Government?

The man who must precede the tide of north-going adventurers—and whose presence in North Bechuanaland has been too long delayed—is the Imperial Com-

missioner accredited from Her Majesty's Government. His early appearance is demanded also to secure to the Imperial Administration those legitimate sources of revenue, by means of which the country would defray the expense of its own government. Our colonists of the Cape Colony and of Natal, as well as the inhabitants of the other South African states, are all destined to profit largely by the opening up of the region. But they have already their hands full of the great questions which come before them in their own local development. The active and direct control of the Crown Colony of Bechuanaland must, for weighty reasons, remain in the hands of the Imperial Government for years to come. If we do not rise to the discharge of this duty, we must recognise our own decadence and lose our own self-respect as a people.

The Transvaal, or South African Republic. By P. H. FORD.

The Cameroons. By H. H. JOHNSTON.—Will be published in the 'Scottish Geographical Magazine.'

Dr. Livingstone and Lake Bangweolo. By E. G. RAVENSTEIN.

The following discussion ensued on the reading of the four preceding papers.

Sir LAMBERT PLAYFAIR directed attention to the magnificent harbour of Mombasa, and the fertility of the surrounding country. The British East African Company, he felt confident, would do their work surely if slowly.

Mr. E. G. RAVENSTEIN said the British East African Company were to be commended for the energy with which they proposed to open up new trade routes to Uganda and the Upper Nile. The proposed station on Lake Baringo would give access to regions not hitherto trodden by Europeans, and probably not even by Mohammedan traders. He quite agreed with Sir Francis de Winton as to the position of Mr. Stanley. The chiefs Bakangai and Kanga, mentioned in the Suakin telegrams, were well-known individuals to the south of the Bomokandi, and the "White Pasha," who was clearly Mr. Stanley, had consequently long since reached the Welle, and had probably joined by this time Emin Pasha, who sorely needed assistance against the forces sent up the river by the Mahdi's successor.

Mr. SILVA WHITE trusted that the East African Company would endeavour to put a stop to the slave trade, and that the interests of the African Lakes Company would not be forgotten.

Mr. H. H. JOHNSTON dwelt upon the great natural advantages of the Kilimanjaro district.

Sir ROBERT FOWLER, Bart., M.P., asked where a Commissioner outside Cape Colony was to reside in accordance with the scheme just suggested by Mr. Mackenzie.

Professor GEORGE (Oxford) wanted to know what became of the thousands said to be carried annually away from their native villages as slaves.

The Rev. J. MACKENZIE said that a Commissioner or Resident would be welcome in any part of South Africa. He was not at present prepared to suggest a place of residence.

Sir FRANCIS DE WINTON expressed his belief that Tippo Tip had remained faithful to his engagements.

Sir L. PLAYFAIR, in answer to Professor George, said that a large proportion were accounted for by the great loss of life which attended the march of a slave caravan to the coast. Men were stolen to serve as carriers, and if they proved unsaleable on arrival at a port they were simply allowed to go.

Sir CHARLES WILSON said that General Gordon, of whose death there could be no doubt, had desired to open up communication between Mombasa and the Victoria Nyanza. There existed no really good harbour between Suakin and Mombasa. He

agreed with Sir Francis De Winton that the "White Pasha" was Mr. Stanley. As to the slave trade, he regretted that no means had been suggested for preventing this huge sacrifice of human life. If the European powers really meant business they could easily put a stop to the exportation of slaves, and he hoped Bishop Lavigerie's attention would be directed to the south-east coast, where an active slave trade appeared to be carried on under the French flag. The organisation of the non-Moslem tribes of Africa, so that they could hold their own, might prove the best means of putting a stop to slave-hunts. Perhaps Mr. Stanley had been detained by the organisation of Niam-niam levies, with whom to come to the relief of Emin Pasha. He endorsed all that Mr. Mackenzie had said with reference to our treatment of the native tribes.

SIR FRANCIS DE WINTON offered some remarks on the probable position of Mr. Stanley. He said Mr. Stanley had not been heard of up to June 10th, when Major Barttelot with considerable reinforcements left the camp at Yambuya. He had, nevertheless, no fear of Mr. Stanley's fate, and he believed that having met with difficulties on the direct road leading to the Albert Nyanza, that explorer had turned to the northward, and had now reached the southern Niam-niam countries, where he would find himself among friendly natives, and in a country affording ample supplies. No direct communication had been received from Emin Pasha of a later date than November last, the messengers having probably been stopped by the war between Uganda and Unyoro. The Arabs had perhaps prevented Mr. Stanley's messengers reaching Major Barttelot. There would be no cause for anxiety until news came from Emin without news of Stanley. The "White Pasha," it had been suggested, was General Gordon, but he regretted to have to say that he did not think this was possible. A man of Gordon's energies could not remain lost for three years.

Notes from the Atlas Mountains. Extracts from a letter of Mr. JOSEPH THOMSON to Sir JOSEPH HOOKER.*

Akkas and Dwarfs in Southern Morocco. By B. G. HALIBURTON.

Through Kakongo. By R. E. DENNETT.

Tuesday, September 11th, 1888.

Photographic and Photo-zincographic Processes Employed in the Ordnance Survey. By Colonel J. H. BOLLAND, R.E.

Note on Geographical Terminology. By H. J. MACKINDER, M.A.†—The author pointed out that one of the great difficulties encountered in the learning of geography was the inaccuracy and paucity of the terms applied to physical features, and one of the worst of these was the use of the word ocean. The present use of the word ocean was perfectly fatal to beginners. Words must be used which in their perspective, so to speak, indicated in some way the relative value of what they

* The Council of the British Association, on the recommendation of a committee of the Geographical Section, made a grant of 100*l.* towards the expenses of Mr. Thomson's expedition.

† In connection with Mr. Mackinder's "Note" it may be stated that the Sectional Committee, at the instance of Mr. Bates, Mr. Mackinder, and Mr. E. G. Ravenstein, unanimously passed the following resolution on September 10th, viz. :—

"The Committee consider that the improvement of English geographical terminology is urgently needed, but that the question is not yet ripe for the consideration of a Committee; they therefore desire the present Secretaries of the Section to formulate their suggestions more definitely, and to report to the Sectional Committee next year at Newcastle."

represented. By the present way of teaching, an impression was left in the mind that there were five great oceans in some way of equal rank. But the mother of oceans was that great ring of water extending round the globe north of the Antarctic circle, and a name was wanted for this physical entity. Though the present names of the oceans might be retained for those purposes where they have proved useful, he would suggest that in teaching and in books this great ocean might conveniently be spoken of as the Southern Ocean. The insufficiency of the present terms might be shown thus. What is termed the Pacific Ocean represents 50,000,000 square miles, the Atlantic 25,000,000, and the Arctic Ocean, even including Hudson's Bay, only 4,500,000 square miles. Much misunderstanding might be saved if the last-named were called the Arctic Sea. In the same way for the expressions with regard to the land, of height, lowness, and flatness, the Germans had much more varied words than ourselves. There was for a high plain *Hochebene*, and for a low plain *Tiefebene*. "*Tableland*" gave the idea of flatness and height, "*plain*" did not. Therefore we had no expression for the vast contrast between high plain and low plain. On three grounds, then, he would suggest that future text-books might adopt the terms "*high plain*" and "*low plain*." (1) They were graphic, and separated the ideas of levelness and flatness, (2) they were complete opposites, and (3) they corresponded to the German terms.

Mr. SILVA WHITE, F.R.S.E., suggested that about 70° S. lat. would be a convenient point for the southern limit of the Antarctic Ocean.

Mr. MACKINDER said the adoption of any fixed line to limit an ocean was contrary to his primary principle.

The River of Joseph, the Fayoum and Raian Basins. By COPE WHITEHOUSE, M.A., F.R.G.S., &c., &c.—The map exhibited by the author (scale 1 in 50,000) was the result of surveys made during 1887-8, under the immediate direction of the Egyptian Government. In conformity with instructions drawn up by Colonel Western, C.M.G., R.E., Director-General of Works, Messrs. Lieurnur and Beychallier, of the Public Works Department, were occupied from November, 1887, to March, 1888. The party consisted of four engineers, thirty-six chainmen and tent-keepers, thirty-two camels, and forty water-tanks. The results are in entire conformity with the observations heretofore presented, and demonstrate the accuracy of the sketch-map made by Capt. Surtees, and the five previous lines of levels run by Mr. Stadler and Major Shahin, in the various expeditions of Mr. Cope Whitehouse. The area of the Raian Basin at the contour of + 30 metres (high Nile) is 686 sq. kilom, or about 180,000 acres. Its eastern extension—the Wadi Lulu—is separated from the Gharaq Basin of the Fayoum by a long narrow bank of hard clay and soft conglomerate, covered with blackish sand, 1000 to 2000 metres in width. Another small basin, the Wadi Safir, connects with the Gharaq Basin at level + 26 m., and the Raian Basin connects with the same depression at + 25 m. The names of *Lulu* (the Pearl) and *Safir* (the Sapphire) have been given to these basins, in view of their future use as the gate, and preliminary reservoir, when the Wadi *Raian* (irrigation) is filled and utilised, as an escape for the Nile Flood and an impounding reservoir during the season of drought. The similarity of shape with the Lake Moeris of the Ptolemaic maps is now more striking. The Wadi Muellah—a depression in the desert to the S.E., about 30 kilometres long and 6 kilometres wide—is separated from the Raian Basin by sand hills and rock, at a mean level of + 50 m. A narrow strip, 8 kilometres long and 1½ wide, lies about 5 metres below high Nile. The southern extremity of the valley has no connection with the Nile below + 100 m. It never, therefore, served as a channel for the Nile, but the distance is not sufficient to preclude a subterranean condition.

The survey of the Fayoum has not been completed, but it is hoped that contours

will be run during the coming season around the north of the lake, and the exact height of the various ruins determined. It is now beyond cavil or dispute that the narrow passage at el-Lahun, with its dyke about three kilometres long and 10 metres high, is the only channel of communication at the level of high Nile between the bed of the river running in the great crevice, which connects the watershed of central Africa with the eastern Mediterranean, and these depressions. The area of the Fayoum at this level may be put at 2500 square kilometres (1000 square miles), and the Raian at 680 square kilometres (250 square miles). This surface of 3180 square kilometres (1250 square miles) was one vast sheet of water before the dyke at El-Lahun was established, not later than B.C. 1400. The heavy alluvial deposits of the Fayoum prove that the communication was uninterrupted for a long period within what may be termed historic times. There are no similar deposits in the Wadi Raian, although over 100 square miles are 70 metres (220 ft.) below the level of the Mediterranean. The basins, together or separately, are perfectly adapted to control the alternate flood and drought. The Raian Basin is, however, sufficient, and the entire cultivable area of the Fayoum appears to have been fully reclaimed at a very early period, and again, in the Roman age, as it should be in the future. There is no question that the Arabic traditions are well founded. This is also the Pithom of the mediæval Jews and Copts, and the Anaris-Heropolis of Manetho and the Septuagint. This region still presents geographical, geological and historical problems of great importance, whose solution will be largely facilitated by the minute and accurate topography due to these protracted and laborious researches.

Mission to El-Wedj. By Captain CONYERS SURTEES.—El Wedj is a port on the east coast of the Red Sea, used by the Egyptian pilgrims returning from Medina. In 1887 Turkish troops occupied the fort which commands the harbour. The author of this paper, temporarily attached to the Egyptian army, was sent by the Egyptian Government to report upon the general condition of the region. Accompanied by an Egyptian officer and Mr. Cope Whitehouse, he inspected the New Fort, the Old Hill Fort of the ninth century, the alleged gold mines, a sulphur mountain, Roman remains in the Wadi Hamz, rock-hewn inscriptions, and encampments of various tribes. Photographs were exhibited, and the strategic and commercial importance of the district discussed. The whole of Egypt in Arabia east of the Gulf of Akaba has now been formally transferred to Turkey. Captain Surtees is of the opinion that there is no auriferous quartz in this neighbourhood, but that petroleum does exist, and that the valleys might be occupied by a considerable population, if proper efforts were made to encourage permanent settlements.

Notes on the Topographic Maps produced by the United States Geological Survey. By G. K. GILBERT.—The author, an official of the United States Survey Office, exhibited specimens of the new maps of the United States on the scales of 1:62,500, 1:125,000, and 1:250,000. On these maps the hydrographical features are shown in blue; the hills are contoured in brown; roads, towns and names are printed in black. The maps are based upon accurate triangulations. No sheets have yet been published, but a considerable number are in proof, and some of them were exhibited to the Section.

On Pahang, an Independent State in the Malayan Peninsula. By W. BARRINGTON D'ALMEIDA.

Formosa. Characteristic Traits of the Island and its Aboriginal Inhabitants. By GEO. TAYLOR, of the Chinese Customs Department.—Will be published in a subsequent No. of the 'Proceedings.'

On the General Adoption of the Gregorian Calendar in Relation to the Universal Hour. By CESARE TONDINI DE QUARENGHI, of the Academy of Bologna.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

Baedeker, K.—Belgium and Holland. Handbook for Travellers. With 12 maps and 20 plans. Ninth edition. Leipsic, Karl Baedeker; London, Dulau & Co., 1888: 12mo., pp. lxii. and 379. Price 6 marks. [Presented by Messrs. Dulau & Co.]

[Joanne's Guides.]—Collection des Guides-Joanne. Itinéraire général de la France, par Adolphe Joanne. Le Nord, avec 7 cartes et 11 plans. Deuxième édition. Paris, Hachette et Cie., 1878: 12mo., pp. xxvii. and 489.

—— Ditto. Ditto. Gascogne et Languedoc. 1 carte et 2 plans. Paris, Hachette et Cie., 1883: 12mo., pp. xx. and 358.

—— Ditto. Ditto. De la Loire à la Gironde, Poitou et Saintonge. 3 cartes et 5 plans. Paris, Hachette et Cie., 1884: 12mo., pp. xxvi. and 259.

—— Ditto. Ditto. Les Pyrénées. 10 cartes, 6 vues à vol d'oiseau, 8 panoramas et une projection de la Chaîne des Pyrénées. Édition de 1885, avec des renseignements pratiques mis au courant en 1887. Paris, Hachette et Cie.: 12mo., pp. lxxxix. and 605.

—— Ditto. Ditto. Bretagne, avec un Appendice pour Iles Anglaises de Jersey et de Guernesey. 8 cartes et 11 plans. Paris, Hachette et Cie., 1886: 12mo., pp. xxxvii. and 483.

—— Ditto. Ditto. Auvergne et Centre. 9 cartes et 5 plans. Paris, Hachette et Cie., 1886: 12mo., pp. xxxix. and 352.

—— Ditto. Ditto. Normandie. 7 cartes et 18 plans. Paris, Hachette et Cie., 1887: 12mo., pp. xl. and 514.

—— Ditto. Franche-Comté et Jura. 5 cartes et 3 plans. Paris, Hachette et Cie., 1888: 12mo., pp. xli. and 384.

—— Ditto. Algérie et Tunisie, par Louis Piesse. 9 cartes et 16 plans. Paris, Hachette et Cie., 1888: 12mo., pp. xc. and 492.

—— Ditto. De Paris à Constantinople. 8 plans, 3 cartes, et 1 panorama. Paris, Hachette et Cie., 1886: 12mo., pp. xxxix. and 342.

—— Ditto. Grèce. I. Athènes et ses Environs. 4 cartes, 10 plans. Paris, Hachette et Cie., 1888: 12mo., pp. lxxxiii. and 216.

—— Ditto. États du Danube et des Balkans. Hongrie méridionale, Adriatique, Dalmatie, Monténégro, Bosnie et Herzégovine. 17 cartes, 12 plans. Paris, Hachette et Cie., 1888: 12mo., pp. li. and 279.

Jukes-Browne, A. J.—The Building of the British Isles: a Study in Geographical Evolution. London, Bell & Sons, 1888: 8vo., pp. x. and 343. Price 7s. 6d. [Presented by the Publishers.]

The object of this volume, the author states, is the geological history of the British Islands, regarded from a geotectonic and geographical point of view; that is to say, it does not deal with the rock-groups of which our islands consist, so much as with the physical conditions under which they were formed, the rocks themselves being described only so far as is necessary for ascertaining whence their component materials were derived, in order to form some conception of the relative position of land and water during each of the successive periods of geological time. As Mr. Jukes-Browne says, the restoration of the geography of any past period is a problem of great difficulty, and the more remote that period is from the present, the greater does the difficulty become. The author gives much more space to the Neozoic period than does Professor

Hull in his volume on the subject. There is no doubt that a knowledge of the geography of the past helps us to understand that of the present, and to this view Mr. Jukes-Browne's interesting work will prove highly suggestive.

Liegard, Stephan.—*La Côte d'Azur*. Paris, Maisson Quantin [1888]: 4to., pp. 430. Price 20s.

This is one of those *livres de luxe* in the production of which the French are unsurpassed. It deals with the Mediterranean coast of France and the Riviera, and is of value from a geographical standpoint for its excellent illustrations of towns and landscapes of that region, and its description of their actual conditions.

Uslar, Baron P. K.—*Etnógraphiya Kavkaza. Yazykoznaníye. Chechenakii yazyk.*—Ethnography of the Caucasus. Philology pt. ii. The Language of the Chechens. Published by the Educational Department of the Caucasus, Tiflis, 1888: pp. viii., 52, 246, and 111.

In our March number we noticed the first part of the late Baron Uslar's linguistic studies relating to the Abkhasian language. The present volume is the second issue, and deals with the Chechenian language. It also contains the late author's letters and a translation in Russian of A. Schiefner's 'Tschetschenische Studien,' as well as some tales and proverbs from the Chechenian, edited by A. Bartolomei. The whole work is edited by M. R. Zavadsky, and forms an excellent handbook to any one desirous of acquainting himself with a language spoken by a people whose numbers have been estimated at 140,000, inhabiting the northern slopes of the Caucasus in Western Daghestan.—[E. D. M.]

Zapiaki Imperatorskago Russkago Geographicheskago obshestva. Po obschei geographii.—Memoirs of the Imperial Russian Geographical Society, vol. xvii. part 3; vol. xviii. parts 1, 3, and 4. St. Petersburg, 1888.

Vol. xvii. part 3 is a collection of meteorological observations of agricultural importance in Russia in 1885 and 1886, by A. J. Voiékov. This is a first attempt in Russia at tabulating information on the weather, having an agricultural economical aspect, and was initiated by the Meteorological Commission of the Russian Geographical Society. A general comparison of the results obtained by the returns for the two years is added by the learned editor.

Vol. xviii. part 1, pp. 55, contains barometrical observations at distant meteorological stations, and during journeys by R. N. Savéliev.

Vol. xviii. part 3, pp. 22, with a plate, is a study by S. Y. Rauner on the methods employed in Western Europe of arresting the movement of drift-sands, and planting them with trees. This question is one of great importance in Russia, where, not only in its Asiatic possessions, but in the European provinces as well, much loss is sustained by the movements of drift-sands; for instance, in the governments of Kief and Chernigof, at the mouth of the Dnieper, the Aleshkof Sands cover about 50,000 acres, and are constantly burying the gardens and cottages of the inhabitants, while farther east, in the government of Astrakhan, and then again in Central Asia, their disastrous effects may be seen on a grand scale.

Vol. xviii. part 4, pp. 16, with table, contains the results of a comparison of normal barometers in a few of the principal meteorological observatories in Europe, by P. J. Bronnoff.—[E. D. M.]

ASIA.

[**Arabia.**—Mekka, von Dr. C. Snouck Hurgronje, mit Bilder-Atlas. Herausgegeben von "Het Koninklijk Instituut voor de Taal- Land- en Volkenkunde van Nederlandsch-Indië te 's-Gravenhage." I. Die Stadt und Ihre Herren. Haag, Martinus Nijhoff, 1888: 8vo., pp. xxiii. and 228. [Presented by His Excellency the Minister for the Netherlands.]

Dr. Snouck Hurgronje's volume, recently issued at the Hague in the German language, comprises the first part of a work on Mekka, which promises to be somewhat unique in its completeness: for although the already published

matter throws little more light on the subject treated than afforded by Burckhardt and later travellers of our own time—whose personal narratives are available in their integrity to the reading public, or have been utilised in encyclopædias and books of reference—the second part will describe the inhabitant of Mekka such as he is at the present hour. The author's residence for one year in Jeddah and the holy city enables him to write with greater confidence than had he undertaken his task with the aid of book-learning only.

Four chapters, with a preface and appendix, make up the volume under notice. The first is a kind of Guide to Mekka, treating of the Masjidu'l Haram or sacred mosque and the Ka'bah, with other shrines or buildings within the walled inclosure, of which full accounts have long since been published in this country and abroad. Three chapters which follow are mainly historical, and relate to the rulers of the city from the rise of the Khalifs to within the last few years of the nineteenth century. It may here be noticed that as the word Caliphate (Khalifat) has been adopted in the English language to represent the rule or office of the Caliphs (Khalifs) of Baghdad, so the word Sharifat (German *Scherifat*) may be admitted in reference to the Sharifs of Mekka. The actual periods selected are from A.D. 630 to 1200; from A.D. 1200 to 1788; and from 1788 to 1887 respectively. Genealogical trees, for the preparation of which the Muslim shows peculiar aptitude, are added to the text, and will be found useful to the student of Arab tribes and dynasties, though scarcely interesting to the majority of readers. Dr. Snouck Hurgronje thinks highly of Othman Pasha, the late Governor of Hijáz, and notwithstanding all that has been urged to the contrary, looks upon the European Turk as a sufficient means for carrying out the better administration of the Arabian Peninsula. We are told that the usual seat of government is at Mekka, and that it is only in the hottest season, and when there are no important affairs to suffer by the change, that His Excellency the Pasha repairs to Taif, a procedure adopted also by the High Sharif. A deputy is stationed at Jidda.

The interest of the present publication is greatly enhanced by a set of accompanying photographic illustrations. Among the seventeen specimens of the scenery, monuments, and people, are photographs of Othman Pasha, the High Sharif Annu'r-Nafik, and of sundry officials and other residents of Mekka, with their children or relatives.

[Burma.]—Indo-Burma. China Railway Connections a Pressing Necessity. With a Few Remarks on Communication in and with Burma, Past and Present. With a map. Blackwood & Sons, 1888: 8vo., pp. 73. [Presented by the Author.]

This *brochure*, signed "Old Arakan," presents a serious and well-informed discussion on the subject of railway communication from Burma to China on the one hand, and India to Burma on the other. The author in the first part gives a brief sketch of our connection with Burma, and of what has been done to open it up by trade routes. He argues strongly against the railway scheme of Messrs. Colquhoun and Hallett, and asserts that our communications with China should be within British territory, and that these communications, in the interests of our Burmese territories, should be established with the least possible delay. In the second part the author gives a brief sketch of the efforts which have been made in the past to connect India with Burma. He then considers the four routes that have been proposed, with the result that he gives a preference to the route from Membo on the Irawady across the Aeng Pass to Akyab, and so north-west by Chittagong. Several other matters in connection with Burma are discussed in the *brochure*, which is a valuable contribution to a question of great importance.

[Danvers, F. C.]—Bengal, its Chiefs, Agents, and Governors. [London, Eyre & Spottiswoode, 1888]: 8vo., pp. 22.

[India.]—A Record of the Expeditions against the North-west Frontier Tribes since the Annexation of the Punjab. Compiled from official sources by Lieut.-Colonel W. H. Paget, Commandant, 5th Punjab Cavalry, in 1873. Revised and brought

up to date, by Lieutenant A. H. Mason, R.E., in 1884. Published by Authority. London, printed by Whiting & Co. : 8vo., pp. xvi. and 679. [Presented by the Secretary of State for India.]

While this volume has been compiled mainly from a strategical and military point of view, it contains much information collected from a variety of sources on all the countries and peoples along the whole of the North-west Frontier. Its utility is made manifest by consulting it with reference to the Black Mountain district, where our little war is at present being waged against the Yusufzais and their neighbours. The volume is amply provided with maps from the latest surveys, and as a whole is a really useful book for geographical reference.

[**Nicobara.**—Ein kurzer Besuch auf den Nicobaren. (Von der Reise S.M. Corvette *Aurora* nach Ostasien.) Geschildert von Dr. Svoboda. 8vo., pp. 26. [Presented by the Author.]

This is a reprint from the 'Proceedings of the Vienna Geographical Society, giving partly the results of a visit to the Nicobar Islands in 1886, and partly containing a summary of the data collected by Dr. Man and other previous writers.

Prjevalsky, N. M.—Ot Kiachtil na istoki joltai réki, izslédovaniye sévernoi okrainii Tíbéta i put cherez Lob-nor po basseínu Tarima. From Kiachta to the sources of the Yellow river, exploration of the northern border of Tibet and route viâ Lob-nor along the basin of the Tarim; with three maps, twenty-nine phototypes, and three full-size illustrations. Published by the Imperial Russian Geogr. Soc., St. Petersburg, 1888: pp. ii., iii., and 536, 4to.

In this work General Prjevalsky tells the story of his fourth expedition into Central Asia. He begins with a chapter on "the art of travel" in that country, based on his twenty years' experience, and containing many hints useful to the young traveller. The qualities necessary in the leader of an expedition, in the men composing it, supplies of all kinds, should be carefully studied in order to ensure success. Nor must less judgment and forethought be exercised in the selection of arms, ammunition, accoutrements, scientific instruments, clothing, &c. Having initiated the reader into some of the mysteries of caravan life with its daily routine, division of labour, discipline, provisioning, &c., Prjevalsky concludes his first chapter by indicating very briefly what yet remains to be done in the way of exploration in Central Asia. The regions, and they are few, as yet unexplored by Europeans, are the following:—The whole of Northern Tibet, where geographical discoveries await the traveller at every step. 2. Eastern Tibet and the Amdo country, a wild alpine region with a luxuriant flora and rich fauna. 3. Southern Tibet between Lhasa and Gartokh. These must be reckoned among the *spolia opima* of future explorers, but there are also other regions where further scientific investigation is much needed. The Pamir with its neighbouring Hindu-Kush and Kara-korum ranges; the Eastern Tian-shan between Karashahr and Hami, and the Western Altai from the meridian of Kobdo to the northern bend of the Yellow river; the Altyn-tagh and the Nan-shan; the mountains bordering South-eastern Mongolia, including those of Ala-shan; the Hingan range with the region to the east of it, and lastly, Northern Manchuria; all these will doubtless yield, in fit hands, scientific facts of the highest value, and he who lifts the veil which yet partially obscures them will have done a real service to geography. Chapter ii. takes us once more across the Gobi from Urga to Ala-shan. We learn, *en passant*, that the trade of Urga amounts to nine millions of rubles (about one million sterling) annually, for the most part in the hands of the Chinese, and that one million pounds of tea are annually imported that way into Russia, notwithstanding the competition of the sea route viâ Odessa. Having crossed the Gobi by the same route as that taken by him in returning from his first expedition in 1873, Prjevalsky proceeds through Northern Ala-shan to Din-yuan-ing (Fu-ma-fu), the seat of government of the district, where the expedition halts to rest for a week, having come 700 miles from Urga. An

excursion into the mountains, whose comparative fertility is explained by the deposits of loess brought hither by westerly winds and moistened by summer rains, is described, and an allusion made to the discovery by some workmen, while digging wells, of human habitations buried beneath about 130 feet of sand and loess, the accumulations of untold ages. Chapter iii. is devoted to Kan-sub, Kokonor, and Tsaïdam, where scenes of former explorations are revisited, a new species of antelope shot and named after Cuvier the naturalist, and additions made to the collections of birds and animals. Chapters iv. and v. deal with the sources of the Hwang-ho. Here Prjevalsky's itinerary crosses that of pundit A-k, upon the inaccuracy of whose observations, as well as of the map founded on them and published by the Trigonometrical Survey Department of India, some interesting remarks are contained in a note. Before starting for the Hwang-ho, Prjevalsky divided his party, leaving seven Cossacks with the bulk of his baggage in Tsaïdam, and proceeding with the remainder (fourteen men in all) to cross the mountains of Northern Tibet.

In the marshy plain of Odontala, the Sing-su-hai, or Starry Sea of the Chinese, lie the sources of the great river of whose disastrous inundations so much has recently been heard. These sources and the two lakes formed by their collective drainage were successively visited by the Russians, and observations made to fix the latitude and height above the sea, the longitude being obtained by computing distances. Here too the author ascended a hill commanding an extensive view of plain and lakes, remarking that upon this hill sacrifices are annually offered by an embassy sent expressly from Peking to propitiate the river god, probably in the hope of preventing a recurrence of these terrible floods as well as to solicit an abundant supply of water for the hundred millions of inhabitants dependent upon it. Seven days' march from Odontala the Russians crossed the watershed between the upper waters of the Hwang-ho and Yang-tse-kiang by a pass 14,700 feet high, experiencing rigorous cold even in the month of June. They now entered a magnificent alpine region, where fresh additions were made to their herbarium. Their farthest point south was the left bank of the Di-chu (Upper Yang-tse-kiang), but having no means of crossing this river with their camels, they were obliged to turn back and retrace their steps to the lakes at the head-waters of the Hwang-ho. These lakes are fully described in the fifth chapter, which also records the attacks made on them by a band of Tangutan robbers. The Russians safely returned to their dépôt in Tsaïdam, and the sixth chapter opens with the second period of the expedition, when they marched through Tsaïdam to the westward to undertake the geographical discoveries narrated in the seventh chapter. (A full translation of this chapter has been promised for the next number of the Supplementary Papers of the R.G.S.). In the eighth chapter we follow the author across the Altyn-tagh to Lob-nor and the Tarim previously visited by him on his second journey in 1877, and described in his book, 'From Kulja across the Tian-shan to Lob-nor.' This time, however, he had ample opportunities for correcting and completing his somewhat hurried and meagre notes and observations made then. He also enters into the history and traditions of Lob and its buried cities, describing fully the inhabitants—a singularly ugly people, judging from their likenesses.

In Chapter ix. Prjevalsky relates how he spent the spring on Lob-nor shooting and observing wild fowl which visit its swamps in extraordinary numbers. In Chapters x.-xii. we follow the travellers to Keria and the oases situate along the southern border of the Tarim Desert. This was the third period of the expedition, and lasted from May to August 1885. The route taken lay along the northern foot of the Kuen Luen, and Prjevalsky gives the name "Russian" to one of its chains, christening the highest peak seen by him in honour of the late Emperor "Tsar Liberator." At the pleasant oasis of Yasulgun the Russians halted for a few days and celebrated the accomplishment of their six-thousandth verst of travel since leaving Kiachta, in fulfilment of a practice carried out by them of making merry, as far as circumstances would permit, at the end of every thousand versts. By the Chinese authorities on this, as on all his previous journeys, Prjevalsky was badly received. They adopted every possible means of hindering his advance and discrediting him in the eyes of the natives—a policy, we regret to say, not unfrequently practised by Russian officials

towards English and other travellers in civilised Russia. Finding, however, that they had resolute men to deal with who would not brook such treatment, the Chinese ambans made their apologies. From Khoten Prjevalsky turned northward along the Khoten-daria to Aksu by the route recently travelled by Mr. Carey and the late Mr. Dalgleish (see 'Proceedings R.G.S.,' December 1887), recrossing the Russian frontier at the Bedel Pass in the Tian-shan on the 29th October (10th November), 1885.

Besides the narrative of the journey, incidents of travel and descriptions of the country and its inhabitants, the volume contains a vast amount of botanical and zoological research, and the maps are worth studying. A separate final chapter (xiii.) is a political study by the author on the inhabitants of Central Asia, and has been translated *in extenso*, and published in a recent number of the 'National Review.'—[E. D. M.]

AFRICA.

Banning, Émile.—Le Partage Politique de l'Afrique d'après les Transactions Internationales les plus récentes (1885 à 1888). Bruxelles, Muquardt, 1888 : 8vo., pp. xi. and 181. [Presented by the Author.]

This may be regarded as a supplement to the author's previous works on the partition of Africa. It is a narrative of the events and negotiations which have led to the existing division of Africa among the European powers, containing copious extracts from official documents, protocols, correspondence, and treaties. It is useful as a record of what has been done up to the present date. The volume contains a map showing the partition, which seems to us on the whole correct. There is no authority, however, for prolonging the northern boundary of German Damaraland eastward along the Zambesi beyond the 20th degree E. long. In the latest Colonial Office map British South Africa is extended north to the Zambesi, with the 20th degree as the western frontier.

Cosson, E.—Compendium Floræ Atlanticæ seu Expositio methodica plantarum omnium in Algeria necnon in regno Tunetano et imperio Maroccano hucusque notarum; ou Flore des États Barbaresques, Algérie, Tunisie et Maroc. Vol. II. Supplément à la partie historique et Flore des États Barbaresques. Renonculacées—Crucifères. Paris, Imp. Nationale, 1883–1887 : 8vo., pp. cviii. and 367. Price 13s.

Kayser, Gabriel.—Bibliographie d'Ouvrages ayant trait à l'Afrique en général dans ses Rapports avec l'exploration et la civilisation de ces contrées depuis le commencement de l'Imprimerie jusqu'à nos jours. Précédé d'un Indicateur. Bruxelles, 1887 : 8vo., pp. xv. and 176.

Rankin, Daniel J.—Arab Tales translated from the Swahili Language into the Tugulu Dialect of the Mákua Language, as spoken in the immediate vicinity of Mozambique. Together with comparative Vocabularies of Five Dialects of the Mákua Language. London, Society for Promoting Christian Knowledge, 12mo., pp. xv. and 46, map. [Presented by the Author.]

South Africa.—Correspondence relating to the High Commissionership in South Africa, and its separation from the Governorship of the Cape. [C.-5488.] London, Eyre & Spottiswoode, 1888 : folio, pp. 22. Price 9d.

A map of South Africa in 1888, from the Zambesi to Cape Agulhas (scale 1 : 7,500,000), accompanies this paper.

Stevenson, James.—The Arabs in Central Africa and at Lake Nyassa. With Correspondence with H.M. Secretary of State for Foreign Affairs on the attitude of Portugal. Glasgow, Maclehose, 1888 : 8vo., pp. xvi. and note. [Presented by the Author.]

This is a useful collection of facts concerning the doings of the Arabs in Central Africa from Livingstone's time downwards. It contains two maps by

Mr. Ravenstein: one of part of Eastern Africa shows the topographical features and European stations; the other of Equatorial Africa, shows tracks of slave caravans, districts harassed and districts depopulated by slave hunters.

Tagliabue, E.—*Dieci Anni a Massaua. Considerazioni politico-coloniali.* Milano, P. B. Bellini e C., 1888: 8vo., pp. 31.

AMERICA.

[**America.**]—*Narrative and Critical History of America.* Edited by Justin Winsor. London, Sampson Low & Co., 1888: vol. vii. part ii., United States of North America, pp. vii. and 610. Price 30s.

This volume virtually concludes the narrative of the United States, since one chapter deals with the wars of the States from 1789 to 1850. An appendix to the volume treats of territorial acquisitions and additions, and contains reproductions of several old maps and plans.

[**Bolivia.**]—*Biblioteca Boliviana de Geografia e Historia. 1. Navegacion del Madre de Dios. Viaje del Padre Nicolas Armentia.* La Paz, 1887: 8vo., pp. iv. and 230. [Presented by Señor M. V. Ballinan of La Paz.]

The Madre de Dios is the river which crosses the north of Bolivia and joins the Beni about 80 miles before the combined rivers flow into the Madeira. In 1881-5 Padre Armentia navigated not only the Madre de Dios, but also the Beni, and traversed a large part of the country which lies between. The volume now published contains the results of the Padre's observations during his journeys on the countries, the people, products and industries. It is accompanied by a map of the region which has been executed in Rio de Janeiro.

Borsari, F.—*La letteratura degl' indigeni Americani.* Napoli, L. Pierro, 1888: 8vo., pp. 76. [Presented by the Author.]

[**Canada.**]—*Geological and Natural History Survey of Canada.* Alfred C. Selwyn, C.M.G., Director. Annual Report (New Series) vol. ii., 1886. Montreal, Dawson Brothers, 1887. [Presented by the Director.]

Besides the Summary Report on the operations of the Survey during 1886, the present volume contains an account of a geological examination of the northern part of Vancouver Island and adjacent coasts, by G. M. Dawson. A report on the geological structure of a portion of the Rocky Mountains, by R. G. McConnell, contains a sketch of the topography of the region dealt with. Mr. J. Tyrrell's report on Northern Alberta and portions of adjacent districts of Assiniboia and Saskatchewan also contains a good deal of topographical description. Among other reports are:—Preliminary report of an exploration of the country between Lake Winnipeg and Hudson's Bay, by A. P. Low; on an exploration of portions of the At-ta-wa-pish-kat and Albany rivers, by R. Bell; on the surface geology of Northern New Brunswick and South-east Quebec, by R. Chalmers; notes to accompany a geological map of the northern portion of the Dominion of Canada, east of the Rocky Mountains, by George M. Dawson; statistical report of the production, value, exports and imports of minerals in Canada, by E. Coste. As usual, the report is accompanied by numerous maps both in the text and in a separate pocket, sections and illustrations.

Canada.—Report of the Select Committee of the Senate appointed to inquire into the resources of the Great Mackenzie Basin. Session 1888. Printed by Order of Parliament. Ottawa, 1888: 8vo., pp. 310. [Presented by Sir Charles Tupper, Bart.]

This Report contains the results of the labours of a committee appointed by the Canadian Parliament to inquire into the resources of the Great Mackenzie Basin and the country eastward to Hudson's Bay. Apart from the conclusions which may be drawn from the evidence as to the availability of the immense region involved for settlement and cultivation, the report contains a great mass
No. XI.—Nov. 1888.] 3 D

of valuable information as to the features and character of the northern regions of the Dominion. The area dealt with covers 1,260,000 square statute miles, exclusive of the islands in the Arctic Archipelago. The coast-line of the area is said to cover 5000 miles, over one-half of which is accessible to sealing and whaling craft. There is an immense navigable lacustrine area, and, it is stated by the committee, a river navigation of 2750 miles, which, with the lake navigation, may be connected with Victoria and Vancouver, by way of the mouth of the Mackenzie, the Arctic Ocean, and Behring Strait and Sea. The most startling conclusions, however, drawn by the committee from the evidence are, that in the region there is a possible area of 656,000 square miles fitted for potatoes, 407,000 square miles suited for barley, and 316,000 square miles suited for wheat. There is a pastoral area of 860,000 square miles, and 274,000 square miles of this, including prairie, may be considered as arable land. About 400,000 square miles is adapted for cultivation or for cattle-feeding. The excellence of the pasturage and of other growths is dwelt upon by the committee, and the richness of pine-trees, forests, and mines. Even when it is admitted that the areas above given overlap, it is quite evident that the conclusions drawn by the committee must be taken with great reserve; they are founded on quite inadequate observation and experiment. No doubt much of the land referred to may be made available for settlement, but before this is attempted much more precise data should be obtained. Meantime the Report, with its maps, may be accepted as an important contribution from some hundreds of actual observers to a knowledge of the Great Mackenzie Basin.

Hooper, E. D. M.—The Forests of the West Indies and British Honduras. Folio. [Presented by the Author.]

A series of Reports upon the Forests of Jamaica (map); Honduras; St. Vincent; St. Lucia; Grenada and Carriacou; Tobago (map); and Antigua (map).

Hugues, Luigi.—Sul nome "America." Seconda Memoria con un' Appendice. Roma, 1888: 8vo., pp. 40. [Presented by the Author.]

Latzina, F.—Geografía de la República Argentina. Buenos Aires, Lagouane, 1888: 8vo., pp. xii. and 758. [Presented by the Author.]

This work has been compiled by Mr. Latzina as a text-book for the higher and normal schools of the Argentine Republic. The work is based on the most trustworthy original authorities, and seems to be compiled with great care and intelligence. As a compendium of the geography, physical and political, it will be found useful. It includes a number of maps executed in Paris.

[North America.]—Pierre Margry. Mémoires et Documents pour servir à l'Histoire des Origines Françaises des Pays d'Outre Mer. Découvrements et Établissements des Français dans l'Ouest et dans le Sud de l'Amérique Septentrionale (1679-1754). Tome 6^{me}. Paris, Maisonneuve et Leclerc, 1888: 8vo., pp. xix. and 759. Price 16s.

The present volume of this very valuable series of original documents relating to the exploration and settlement of North America, deals, in the first section, with enterprises on the north and south of Lake Superior, and the country of the Sioux and Assiniboias. The second section, covering 400 pages, contains documents relating to the exploration of the western affluents of the Mississippi, and the opening up of communications with Old and New Mexico. The third section, 150 pages, refers to the coast of Lake Superior and the Missouri, as far as the Rocky Mountains; and the last, 75 pages, to projects of settlement on the east of the Mississippi.

[N.W. America.]—U.S. Coast and Geodetic Survey.—Methods and Results.—Voyages of Discovery and Exploration on the N.W. Coast of America from 1539 to 1603. Washington, Government Printing Office, 1887: 4to., pp. 155-253.

Professor George Davidson, in this appendix to the Geodetic Survey Report for 1886, has collated his own observations on the N.W. Coast of America

with the narratives of Ferrelo, Cabrillo, Ulloa and Vizcaino, Drake, and other early navigators, with the result that he has been able to identify many places mentioned in the latter and clear up several obscure passages.

Petitot, Émile.—Traditions Indiennes du Canada Nord-Ouest (1862–1882). Textes Originaux et Traduction Littérale. Alençon, 1888: 8vo., pp. vi. and 446. [Presented by the Author.]

The Abbé Petitot has done good service to ethnology and philology in bringing together these traditions and folk-lore of the people among whom he dwelt so long, with a French translation alongside.

AUSTRALASIA.

Favenc, Ernest.—The History of Australian Exploration from 1788 to 1888. Sydney, Turner & Henderson, 1888: 8vo., pp. xv. and 474. [Presented by Sir Saul Samuel, K.C.M.G.]

Mr. Favenc's volume is issued under the auspices of the Governments of the Australian Colonies. It deserves this compliment, for it bears evidence of having been compiled with conscientious care from State documents, private papers, and other authentic sources. The exploration of Australia has been carried out mainly under private enterprise, and it is therefore a matter of considerable difficulty to obtain authentic information of the results. Mr. Favenc seems to have overcome this difficulty as well as it could be done, and the result is a work which may be taken as the authority on the subject, and which is, moreover, highly interesting reading. Mr. Favenc has himself done good work in Australian exploration, having been in the Queenlander Transcontinental Expedition of 1878–9, and later having traced the courses of the rivers running into the Gulf of Carpentaria, near the Queensland border. At the present time he is engaged in examining the country on the Gascoyne and Murchison. Mr. Favenc summarises what has been done to open up Australia as follows:—New South Wales, contains no unexplored country; Victoria, none; Queensland, a small portion of Cape York Peninsula; South Australia, a considerable area; and Western Australia, a very great deal. Mr. Favenc by no means takes the hopeless view of the western half of the continent which is generally maintained. The work is accompanied by a large map showing the routes of the leading expeditions, and reproductions of three older maps.

WEST INDIES.

Sinclair, A. C., and Fyfe, Laurence R.—The Handbook of Jamaica for 1888–89, comprising Historical, Statistical, and General Information concerning the Island. London, E. Stanford, 1888: 8vo., pp. xii. and 566, map. [Presented by Sir Henry Norman.]

GENERAL.

Annual Report of the Board of Regents of the Smithsonian Institution, showing the Operations, Expenditures, and Condition of the Institution to July 1885. Part II. Washington, Government Printing Office, 1886: 8vo., pp. xi., 264, vii. and 939. [Presented by the Smithsonian Institution.]

This volume is mainly occupied with a description of the George Catlin Indian Gallery, with memoir and statistics, by Mr. Thomas Donaldson, profusely illustrated, and containing a separate pagination and a special index.

Berlioux, E.-F.—Les Chêtas sont des Scythai. Notice. Lyon, Association Typ., 1888: large 8vo., pp. 15. [Presented by the Author.]

Jahresbericht des Direktors des Königlich Geodätischen Instituts für die Zeit von April 1887 bis April 1888. Berlin, P. Stankiewicz, 1888: 8vo., pp. 39.

Gunther, [Dr.] Siegmund.—Johannes Kepler und der Tellurisch-Kosmische Magnetismus. 'Geographische Abhandlungen,' herausgegeben von Prof. Dr.

Albrecht Penck. Band III. Heft 2. Wien, Hölzel, 1888: 8vo., pp 71. [Presented by the Publishers.]

In this paper Dr. Günther discusses the knowledge of terrestrial magnetism in the time of Kepler; Kepler's investigations on the terrestrial magnetic elements and the position of the magnetic pole; Kepler's theory of the magnetic planetary axes, and universal attraction.

Landau, [Baron] Wilhelm von.—Travels in Asia, Australia, and America, comprising the period between 1879 and 1887. Part I. New York, G. Landau, 1888: 12mo., pp. 357. [Presented by the Author.]

[**London Library.**—Catalogue of the London Library, St. James's Square, London. With Preface, Laws and Regulations, and Appendix containing List of Members, Contents of Voluminous Collections, Alphabetical List of Tracts, and a Classified Index of Subjects. By Robert Harrison, Secretary and Librarian. Fifth edition [2 vols.] 1888: 8vo., pp. xvi. and 1161; (Appendix) xlv. and 463. [Presented by the London Library.]

Mitford, Major-General R. C. W. Reveley.—Orient and Occident. A journey East from Lahore to Liverpool. With illustrations from sketches by the Author. London, W. H. Allen & Co., 1888. Price 8s. 6d.

General Mitford's name as the author of 'To Cabul with the Cavalry Brigade' is sufficient to ensure for his new book a large number of readers, who will find that he takes them with him very pleasantly over a long and interesting journey. Leaving Lahore towards the end of the cold season of 1886, he travelled by way of Lucknow, Benares, Calcutta, Penang, Singapore, Hongkong, Japan, San Francisco, and New York to Liverpool, having taken a little under seven months on the trip. There is much, of course, that has already been frequently described by previous travellers; but the whole is written in a pleasant chatty style that renders even well-worn subjects agreeable reading. There are 94 full-page and folding illustrations, and a chart of the route at the end. Some of the former are extremely good, as the views of the Great Salt Lake, and the entrance to Singapore harbour, and some very bad, as, Niagara from the Canadian side, and the boat on the Inland Sea, described as "very sharp at the bows," but depicted with remarkably bluff ones. There are also an alarming number of errors in the book, not only of typography, but also of fact; and the author appears to have noted down a great deal on very imperfect and erroneous information.

[**Sans, R. Monner.**—Importancia y necesidad del Estudio de la Geografia. Discurso leído ante la Sociedad Barcelonesa de Amigos de la Instrucción en la recepción pública del socio D. R. Monner Sans. Barcelona, J. Subirana, 1887: large 8vo., pp. 16. [Presented by the Author.]

[**The 'Challenger' Voyage.**—Report on the Scientific Results of the Voyage of H.M.S. Challenger during the years 1873-76, etc., etc. Zoology—vols. xxvi. and xxvii. London, Eyre and Spottiswoode, 1888: 4to., pp. (vol. xxvi.) viii., ix., 399, 240, and 56, (vol. xxvii.) pp. viii., xi., 221, 42, 27, and 166, plates. Price (vol. xxvi.) 50s., (vol. xxvii.) 30s. [Presented by the Lords Commissioners of Her Majesty's Treasury.]

The Travellers' Medical Guide: A Brief Manual for Explorers, Missionaries, Colonists, and Ship-Captains. By a Physician. Second edition. London, Whiting & Co., 1888: 12mo., pp. viii. and 56. Price 1s.

The following works have also been added to the Library:—

Anville [J. B. B. d']. Proposition d'une Mesure de la Terre, dont il résulte une diminution considérable dans sa circonférence sur les Parallèles. Paris, 1735: 16mo., pp. xxix. and 147, map.

[**Dellon, D.**].—Relation de l'Inquisition de Goa. Leyde, D. Gaaabeek, 1687: 16mo., pp. 220.

[**Denis, Ferdinand.**].—Le Génie de la Navigation, statue en bronze exécutée par M. Daumas pour la ville de Toulon. Toulon, Laurent; Paris, Ledoyen, 1847: 8vo., pp. 136, plate.

[The above three works were presented by M. James Jackson.]

Featherstonhaugh, G. W..—A Canoe Voyage up the Minnay Sotor; with an Account of the Lead and Copper Deposits in Wisconsin; of the Gold Region in the Cherokee country; and Sketches of Popular Manners, &c., &c., &c. [2 vols. in 1]. London, R. Bentley, 1847: 8vo., pp. (vol. i.) xiv. and 416; (vol. ii.) vii. and 351, maps and plates.

Galignani's Traveller's Guide through France, containing a Geographical, Historical, and Picturesque description of every remarkable place in that kingdom, etc., etc. Eighth edition. Paris, A. and W. Galignani, 1827: 16mo., pp. lii. and 815. [Presented by R. McLachlan, Esq.]

Mackenna, B. Vicuna.—A traves de los Andes. Estudio sobre la mejor ubicacion del futuro ferro carril interoceánico entre el Atlántico i el Pacífico en la América del Sur (la República Argentina i Chile). Santiago, Imp. Gutenberg, 1885: 12mo., pp. x. and 366, map.

Magalhães, Conto de.—O Selvagem. I. Curso da Lingua Geral Segundo Ollendorf, &c. II. Origens, Costumes, Região Selvagem, &c. Rio de Janeiro, 1876: 8vo., pp. xlviii., 281, and 194.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

ARCTIC REGIONS.

Baffin Land.—Die Eisverhältnisse des Südöstlichen Teiles von ——. Nach den Beobachtungen amerikanischer Walfischfänger von Dr. F. Boas. Central scale 1:6,000,000 or 82·2 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1888, Tafel 18. Gotha, Justus Perthes. (*Dulau.*)

EUROPE.

Danmark.—Generalstabens topographiske Kaart over ——. Scale 1:40,000 or 1·8 inches to a geographical mile. Kalchographeret og graveret ved Generalstaben. Kjöbenhavn, 1887. Sheets:—"Gedsted," "Hobro," and "Holstebro." (*Dulau.*)

Italia.—Carta del Regno d' —, alla scala di 1:100,000 or 1·3 geographical miles to an inch. Istituto geografico militare. Firenze. Sheets:—44, Novara; 54, Oulx; 58, Mortara; 70, Alessandria; 71, Voghera; 72, Fiorenzuola d'Arda; 73, Parma; 82, Genova; 83, Rapallo; 84, Pontremoli; 85, Castelnovo ne' Monti; 86, Modena; 94, Chiavari; 95, Spezia; 96, Massa; 97, S. Marcello Pistoiese; 104, Pisa; 105, Lucca; 111, Livorno; 112, Volterra; 119, Massa Marittima. Price 1s. 4d. each sheet. (*Dulau.*)

Portugal.—Government Map of —. Scale 1:100,000 or 1·3 geographical miles to an inch. Sheets Nos. 1 and 34, Levantada, construida e gravada pela Direcção geral dos trabalhos geodesicos do Reino. Publicada em 1887. (*Dulau.*)

ASIA.

Indian Government Surveys:—

Map of India, showing Railways open to traffic, under construction, and under survey on 31st March, 1888. 96 miles to an inch. Accompaniment to the Railway Administration Report for the year 1887-8.—India, showing percentage of sugarcane to cultivated area. 64 miles to an inch. 1887. 2 sheets.—Contour Map of India, 1886. Based on a System of Approximate Contours. 64 miles to an inch. 2 sheets.—Kathiáwar Survey. 1 inch to 1 mile. Sheet No. 79 (Second Edition). Parts of Halar, Kathiáwar and Gohelwad. Season 1871-72.—Rajputana Survey. 1 inch to 1 mile. Sheet No. 76, Part of Jodhpore, Palanpur and Sirohee. Seasons 1881-82, 1884-85 and 86.—Rajputana Survey. 1 inch to 2 miles. Half Degree Sheet No. VIII. North. Sheets Nos. 38, 39, 53, and 54, Part of Jodhpore. Seasons 1878-79, 1883-84-85 and 86. Half Degree Sheet No. VIII. South. Sheets Nos. 40, 41, 55 and 56, Part of Jodhpore. Seasons 1878-79, 1883-84-85 and 86.—Nikobar Survey. 1 inch to 2 miles. Sheet No. 1, Northern Group. Season 1886-87. Sheet No. 2, Central Group. Season 1886-87. Sheet No. 3, Southern Group. Season 1886-87. With a General Map of the Nikobar Islands, 1886-87. Scale 5 miles to an inch.

Japan.—Temperatur- und Regenkarte von ——. Von Dr. Julius Hann. 6 maps on one sheet. Petermann's 'Geographische Mittheilungen,' Jahrgang 1888, Tafel 17. Gotha, Justus Perthes. (*Dulau.*)

AFRICA AND MADAGASCAR.

Afrique.—La Carte d' ——. Scale 1:2,000,000 or 27 geographical miles to an inch. Sheets:—No. 7, Ben Ghâzi; No. 15, Cap-Elba; No. 19, Agadez; No. 22, Souakiu; No. 30, Berbéra; No. 38, Mouqdicha. Publié par le Service Géographique de l'Armée. Paris, 1886-88. With hill-shading. (*Dulau.*)

This map is now fast approaching completion, and all the sheets of the present issue belong to the *édition définitive*, in which the orography is indicated by hill-shading, which has not been the case with any of those which have been previously added to the Society's collection.

Sheet 7 includes that portion of Tripoli which is bounded by the Mediterranean between Bou Saida and Ras-el-Karnais, and the interior country as far as lat. 28° 50' N. The routes of travellers have been carefully laid down, and are easily distinguished from one another, each being marked throughout with the traveller's initial letter. Sheet 15 only contains about twenty miles of the African coast on the Red Sea, and a part of the coast of Arabia, the greater portion of the remaining space being occupied by an inset plan of the ruins of Thebes, drawn on the scale of half an inch to the mile. On sheet 19 is shown the country lying between lat. 14° 25' N. and lat. 21° 35' N., long. 7° 40' E. and 17° E. It contains numerous notes, having reference to the dates on which certain places were visited by travellers, the geology, botany, and general appearance of the country. Sheet 22 contains the Red Sea coast from Ras Kosar to Farat, and the interior, as far as the country round Kassala; there is also a sketch of the Arabian coast; and inset maps are given of Khartoum and Massowah. The Somali country is shown on Sheets 30 and 38, and an inset plan of Aden is given.

Madagascar.—Carte de ——, dressée par le Père D. Roblet, S. J. Missionnaire de Madagascar, Octobre 1885. Scale 1:1,000,000 or 13·6 geographical miles to an inch. H. Lecene et H. Oudin, Editeurs, Paris. (*Dulau.*)

This map contains a far greater amount of detail than any other previously published, which is especially noticeable in the Imerina and Betsileo districts, and parts of Western Madagascar, where a considerable amount of new work is shown; there is, however, hardly any part of the map which does not give

details that have not previously appeared. The map is nicely drawn, the hill-shading has been done with brown chalk, and shows well in contrast with the green colouring which indicates the extent of the forest-clad country. Routes are laid down, and the elevations of many places above sea-level are given in metres. On an inset map there is an excellent plan of Antananarivo, in which the topographical features are indicated by contours. Taken as a whole, the map is a very creditable specimen of cartography, the compilation of which must have entailed on Père Roblet a vast amount of patient painstaking work.

Nyassa and Tanganyika.—A Map of the Country between Lakes ———. Largely based upon unpublished Materials furnished by James Stevenson, F.R.S.E. Compiled by E. G. Ravenstein, F.R.G.S. Scale 1:750,000 or 10·3 geographical miles to an inch. London, George Philip & Son. Price 1s.

In the compilation of this map the following unpublished materials are stated to have been used by Mr. E. G. Ravenstein:—A sketch map of the country between Karonga and Mwinini Wanda, by the late Mr. W. O. McEwan; a sketch of the road from Tanganyika to Nyassa, by Mr. E. C. Hore; a similar sketch by Lieut. Wissmann; notes on the Lake-Junction Road, by Mr. Fred Moir; a sketch map of Mr. J. W. Moir's journey into the Loangwa Valley; a map of a journey from Bandawe to Kambombo's, and thence to Chirengi, by Mr. McEwan and Mr. Donald Munro; Mr. McEwan's diaries, containing observations of Latitudes and Longitudes; Notes on a Journey along the Lake-shore from Bandawe to Karonga, by Mr. Donald Munro.

Among the above materials it will be noted how large a portion has been contributed by the late Mr. W. O. McEwan, which should be thoroughly reliable, as this gentleman was by profession a civil engineer, and previous to leaving for Africa, went through a course of instruction in practical astronomy at the Royal Geographical Society. Having become an excellent observer and computer, he was supplied with some instruments by this Society, which he supplemented by others purchased at his own expense. Of these he made good use whenever an opportunity presented itself, until his career was cut short by his untimely death.

AMERICA.

Nicaragua Canal.—Chart of the World, showing Distances Saved by the Inter-oceanic Canal of Nicaragua and Costa Rica. Julius Bien & Co. Photo. Lith. New York.

South America.—Cartes Commerciales, Physiques, Politiques, Administratives, Routières, Ethnographiques, Minières et Agricoles, avec Notice Descriptive comprenant les Renseignements les plus récents sur l'Histoire, les Mœurs, les Coutumes et le dénombrement des Populations, les Statistiques Commerciales, les Produits à Importer, les Industries à Créer, la Législation, l'Administration, les Tribunaux, &c. Par F. Bianconi, Ingénieur-géographe, avec la collaboration des principaux voyageurs Français. Publiées par la Librairie Chaix, Paris. Price 5s. each. London, L. B. Tamini.

No. 1. République Orientale de l'Uruguay. Scale 1:1,800,000 or 24·6 geographical miles to an inch. Dressée par F. Bianconi, Ingénieur-géographe et A. Potel, Ingénieur civil. (Deuxième édition mise à jour) 1887.

No. 2. République Argentine, par F. Bianconi, Ingénieur-géographe, et E. Broc. Scale 1:6,000,000 or 82·2 geographical miles to an inch. 1887, 2^e édition mise à jour.

No. 4. République de Bolivie, par F. Bianconi et Luis Salinas Vega. Scale 1:4,500,000 or 62·5 geographical miles to an inch. 1887.

No. 9. États-Unis de Vénézuëla, par F. Bianconi et E. Broc. Scale 1:3,400,000 or 46·5 geographical miles to an inch. 1888.

No. 10. Colombie et Équateur, par F. Bianconi et E. Broc. Planisphère spécial

indiquant les itinéraires futurs par le Canal de Panama. Scale 1:5,600,000 or 76·7 geographical miles to an inch. 1887.

The above maps form a part of the sixth series of commercial maps published by the *Librairie Chaix*, Paris. Each map is accompanied by 27 to 40 pages of letterpress, in which is given information relating to the topography, history, and present political and commercial condition of each country; statistics with reference to the climate, death-rate, and customs duties are also furnished. The maps have been prepared by M. F. Bianconi, who, it is stated, has been assisted by gentlemen having special knowledge of the several countries—this, however, we can hardly suppose to have been the case with the map of Bolivia, the boundaries of which are incorrectly laid down; and this mistake is repeated in the letterpress where it states that Bolivia is bounded on the east by the Pacific Ocean and Peru, the fact being that Bolivia has not (since the late war with Chili) any portion of its territory which touches the Pacific Ocean. The maps are nicely drawn, and show all means of communication; but to fulfil the purpose for which they are published, greater care should be taken in their compilation, so as to prevent the recurrence of such mistakes as we have alluded to.

CHARTS.

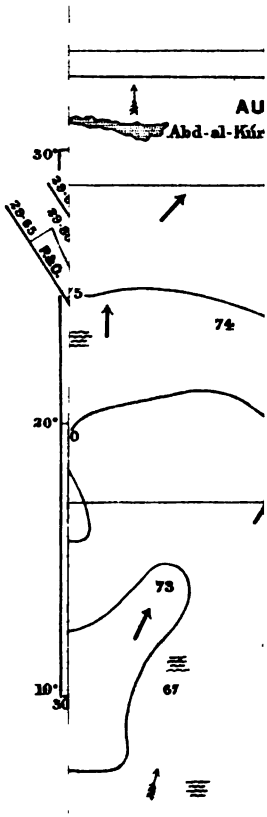
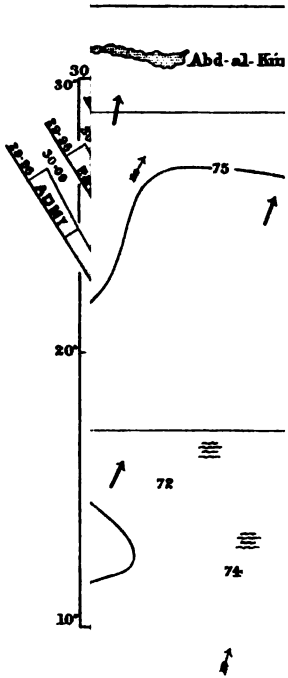
Aveiro.—Plano Hydrographico da Barra e Porto do Rio de ——. Scale 1:20,000 or 3·6 inches to a geographical mile. Levantado em 1865 sob a direcção do Conselheiro F. Folque. Pelo engenheiro hydrographo A. M. dos Reis. Coadjuvado na sondagem fora da Barra pelo Tenente do Exercito C. A. da Costa. 1887. Gravado e publicado na Direcção Geral dos trabalhos geodesicos. (*Dulau*.)

United States Charts.—No. 94, Fangaloo Bay (Island of Upolu), Samoa Group. Fröm a Survey in 1888 by the officers of the U.S.S. *Mohican*, Commander B. F. Day, u.s.n. commanding.—Pilot Charts of the North Atlantic Ocean. September and October, 1888. Published at the Hydrographic Office, Navy Department, Washington, D.C. G. L. Dyer, Lieutenant u.s.n., Hydrographer to the Bureau of Navigation.

ATLASES.

Stieler's Hand-Atlas.—Neue Lieferungs-Ausgabe von ——. 95 Karten in Kupferdruck und Handkolorit, herausgegeben von Prof. Dr. Herm. Berghaus Carl Vogel und Herm. Habenicht. Erscheint in 32 Lieferungen (jede mit 3 Karten, die letzte mit 2 Karten und Titel). Nach Erscheinen der letzten Lieferung wird den Abonnenten ein vollständiges alphabetisches Verzeichnis aller im Atlas vorkommenden Namen mit Hinweis, wo dieselben auf den Karten zu finden, zu einem mässigen Preis zur Verfügung gestellt. Zur Abnahme desselben ist kein Abonnent verpflichtet. Die Lieferungen werden in Zwischenräumen von 4 bis 6 Wochen ausgegeben. *Zweite Lieferung.* Inhalt: No. 21, Österreich-Ungarn, Blatt 4 in 1:1,500,000, von C. Vogel. No. 26, Italien, Blatt 4 in 1:1,500,000, von C. Vogel. No. 93, Süd-Amerika, Blatt 4 in 1:7,500,000, von H. Habenicht. *Dritte Lieferung.* Inhalt: No. 18, Österreich-Ungarn, Blatt 1 in 1:1,500,000, von C. Vogel. No. 24, Italien, Blatt 2 in 1:1,500,000, von C. Vogel. No. 90, Süd-Amerika, Blatt 1 in 1:7,500,000, von H. Habenicht. *Vierte Lieferung.* Inhalt: No. 20, Österreich-Ungarn, Blatt 3 in 1:1,500,000, von C. Vogel. No. 25, Italien, Blatt 3 in 1:1,500,000, von C. Vogel. No. 94, Süd-Amerika, Blatt 5 in 1:7,500,000, von O. Koffmahn. *Fünfte Lieferung.* Inhalt: No. 15, Südwest-Deutschland und die Schweiz, nördl. Bl., von C. Vogel. No. 16, Südwest-Deutschland und die Schweiz, südl. Bl., von C. Vogel. No. 28, Frankreich, Blatt 1 in 1:1,500,000, von C. Vogel. Gotha, Justus Perthes, 1888. Price 1s. 6d. each part. (*Dulau*.)

TEMPERATURE
OFF CAPE G



LIGHT →
FRESH →
STRONG →

ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by Colonel H. H. GODWIN-AUSTEN, F.R.S., J. K. LAUGHTON, M.A., and DOUGLAS W. FRESHFIELD, M.A. Contents: Hints on Surveying and Astronomical Observations. John Coles, F.R.A.S.—Meteorology. R. Strachan, F.M.S.—Geology. W. T. Blanford, F.R.S.—Natural History. H. W. Bates, F.R.S., Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.—Anthropology. E. B. Tylor, D.C.L., F.R.S.—Photography. W. F. Donkin, M.A.—Medical Hints. G. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department.—General Outfit. Colonel J. A. Grant, C.B., Edward Whymper, and others. Price, in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, W.; and to be had of Edward Stanford, 55, Charing Cross, S.W.

Instruction for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. Surveying and Mapping, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. Geology, including practical training in the field. By Mr. W. Topley, F.R.S., of the Geological Survey. 3. Botany. By Mr. N. E. Brown, of the Herbarium, Kew. 4. Photography. By Mr. John Thomson, Author of 'Photographic Illustrations of China and its People,' and other works.

The lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2s. 6d.

Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers, Vol. II. Part 2.—Now Ready.—CONTENTS:—A Bibliography of Algeria. By Lieut.-Colonel Sir ROBERT LAMBERT PLAYFAIR, K.C.S.I., H.M. Consul-General, Algiers.

* * * Fellows who have not applied for the Parts as published, can have Vol. I. complete by applying at the offices of the Society, 1 Savile Row, W.

LIMMER'S HOTEL,

CONDUIT STREET, W.

This old-established Hotel, situated in the centre of the most fashionable part of London—being mid-way between Bond Street and Regent Street—contains every convenience for the accommodation of **FAMILIES** and **Gentlemen**.

The Banqueting Hall is specially adapted for **Military** and other **Dinners**, and **Wedding Breakfasts**.

Address—**THE PROPRIETOR.**

Messrs. W. & A. K. JOHNSTON have been awarded a
DIPLOMA OF HONOUR

at the **BRUSSELS INTERNATIONAL EXHIBITION**,
for a copy of their **ROYAL ATLAS** on exhibit there.

Full details of the **Royal Atlas** will be found in
their complete **Catalogue**, which is sent **Post-free** to
any address.

W. & A. K. JOHNSTON

(ESTABLISHED 1825),

GEOGRAPHERS TO THE QUEEN, EDUCATIONAL & GENERAL PUBLISHERS

EDINA WORKS, EASTER ROAD, EDINBURGH;

AND

5, WHITE HART STREET, WARWICK LANE, LONDON, E.C.

LONDON: PRINTED BY WILLIAM CLOWES AND SONS, LIMITED, STAMFORD STREET AND CHARING CROSS.

Authors are alone responsible for their respective statements. In MS. communications all new or unfamiliar geographical names should be written in imitation of Roman type.

VOL. X., No. 12.
New Monthly Series.]

DECEMBER, 1888.

[To Non-Fellows,
PRICE 1s. 6d.

DEC 24 1888
PROCEEDINGS

OF THE

Royal Geographical Society

AND

Monthly Record of Geography.



PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL, AND EDITED BY
THE ASSISTANT SECRETARY, 1, SAVILE ROW.

CONTENTS.

	PAGE		PAGE
THE NIGER DELTA. By H. H. JOHNSTON, H.M. Vice-Consul for the Oil Rivers	749	GEOGRAPHICAL NOTES	790
THE KEY, OR KÉ, ISLANDS. By Captain G. LANGEN	764	REPORT OF THE EVENING MEETINGS	800
A NOTE ON THE CONSERVATIVE ACTION OF GLACIERS. By DOUGLAS W. FRESH- FIELD, SEC. R.G.S.	779	PROCEEDINGS OF FOREIGN SOCIETIES	801
		NEW GEOGRAPHICAL PUBLICATIONS	803
		NEW MAPS	809
		INDEX	813

MAPS.

THE NIGER DELTA	812
THE KÉ ISLANDS	812

LONDON: EDWARD STANFORD, 26 & 27, COCKSPUR STREET, CHANCING CROSS, S.W.
 PARIS: ANDRÉAU-GOUJON.
 VIENNA: ARTARIA & Co.
 HAMBURG: L. FRIEDERICHSEN & Co.
 ST. PETERSBURG: WATKINS & Co.
 MANCHESTER: JOHN HEYWOOD.
 EDINBURGH: DOUGLAS & FOULIS.
 DUBLIN: HODGES, FOSTER & Co.
 BERLIN: D. REIMER.
 LEIPZIG: F. A. BROCKHAUS.
 NEW YORK: SCRIBNER & WELFORD.
 PHILADELPHIA: LIPPINCOTT & Co.
 MELBOURNE: GEORGE ROBERTSON & Co., LIMITED.

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED.
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA	Fortnightly.	BATAVIA	Fourweekly.
MADRAS	"	BRISBANE	"
COLOMBO	"	ROCKHAMPTON	"
RANGOON	"	ZANZIBAR	"
KURRACHEE	"		
BAGHDAD	"		

Delivering Mails, Passengers, Specie, and Cargo at all the principal Ports of
INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars; or to

GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall,
and 109, Leadenhall Street, London.

LIEBIG COMPANY'S EXTRACT OF MEAT

Justus von Liebig

. Ask for the COMPANY'S EXTRACT,
and see that it bears JUSTUS VON LIEBIG'S
SIGNATURE IN BLUE INK across the Label.

LUXURIANT GLOSSY HAIR

Is assured to those who discard poisonous hair restorers and dyes and cheap oils,
which produce eruptions on the scalp, and use

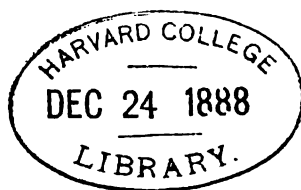
ROWLANDS' MACASSAR OIL,

Known for nearly 100 years as the best Preserver and Beautifier of the Hair.
It contains no lead or mineral ingredients, and can now also be had in a
GOLDEN COLOUR for fair-haired children.

† Sizes, 3s. 6d., 7s., 10s. 6d. (Family bottles equal to 4 small).

Ask Chemists for ROWLANDS', and avoid cheap worthless imitations under similar names.





PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

The Niger Delta.

By H. H. JOHNSTON, H.M. Vice-Consul for the Oil Rivers. .

(Read at the Evening Meeting, November 12th, 1888.)

Map, p. 812.

THE "Oil Rivers"—so called from the fact of their producing the bulk of the palm oil exported from West Africa—are the main rivers, creeks, and estuaries lying between the eastern boundary of the British colony of Lagos and the northern frontier of the German Protectorate of the Cameroons. They are chiefly branches of the Niger, and form the Niger Delta, but some few of them have sources independent of that great stream; although close to the sea-coast, within tidal influence, the estuaries of these rivers are interconnected by a wonderful network of more or less navigable creeks. This system of natural canalisation is here and there blocked with vegetable growth, sandbanks, fallen trees, or artificial obstacles constructed by quarrelsome or timid natives; but with a relatively small amount of labour and at a moderate cost, the creeks in places might be deepened and cleared, and inland navigation rendered practicable between Dahome and the Cameroons Protectorate.

Before giving you more detailed information about certain portions of the Niger Delta, I will endeavour to describe in a general manner what these rivers are like. Just as by a process of modern photography we can obtain a general type of a race by merging a number of portraits of individuals into one average illustration, so, sinking the minor differences of each one of these many West African streams, I shall attempt to convey a general impression of the features they possess in common.

Arriving from Europe by sea, it is generally by the soundings and discoloured appearance of the water that we become aware of the near approach to land, rather than by sighting any part of the shore. When within a few miles of the mouth of one of these rivers, the low coast-line is at first indicated by isolated trees, which appear as islets of forest unconnected with each other, and distorted by the mirage of each horizon. Gradually these islets, which are really the loftier trees of

the fringe of coast forest, become united in one line of purple green, divided only by the imposing gap of the estuary for which our ship is bound.

The bar of the river may be—as in the case of Old Calabar and Bonny—so deep as to be without danger, or it may be relatively shallow, as at Opobo or Akasa, but in all cases it is to be presumed that the vessel destined to cross it does not exceed the limited draught, and is properly steered according to the chart, and consequently incurs no danger. Once over the bar and within the estuary, we find ourselves surrounded by a lake-like expanse of smooth water, the shores of which are fringed with lofty mangroves with their ghastly white, blood-streaked trunks—streaked where the bark has been torn or frayed—and their graceful poplar-like foliage of a sad, dull, yellow-green. Behind the mangroves, however, generally show the dark and dense masses of inland forest, growing where the land has acquired firmness and lies just above the limits of high tide; or as far as you can see from the ship's deck, all and everything that is not yellow water may be unvarying mangrove.

The mangrove in West Africa is a tree that, taken by itself, is rather picturesque and stately: it is the wearisome monotony and want of variety of its extensive forests that form such a depressing aspect. As you ascend the river further and further from the sea the mangrove loses its exclusive possession of the shores, even if this possession be not here and there broken by little islets of firm land covered with varied vegetation, and generally the sites of villages. Almost before the water has ceased to be brackish, the pandanus or screw-pine begins to oust the mangrove, and below its fantastic whorls of spiny leaves the lovely *Lissochilus* orchids conceal the black mud with their leaves, and rear their stout flower-stems to a height of 6 or 7 feet. The effect of their masses of mauve-crimson golden-centred blossoms, each one nearly the size of a child's hand, standing out against the vivid spinach-green of the pandanus, is very striking.

At some spot where there is a stretch of clean white sand and firm soil emerging from the mud, you may distinguish a landing-place of some native village, which is usually characterised by a strip of varied forest, mingling with the lingering pandanus and mangrove. Possibly this is some little inlet or bay, protected from the strong wavelets created by the sea-breezes, which are liable to disturb the equilibrium of the native's canoe. The shore of the sandy beach is bright with the crimson flowers of the tall cannas. The natives' canoes are drawn up to the limit of the high tide, and fastened to stakes. The village will probably lie some quarter of a mile inland, and be embowered in exuberant forest. The houses will be poor, ramshackle structures of palm-fronds, and their inhabitants timid, naked fisher-folk, possessing a few fowls, goats, and many dogs.

Resuming the ascent of the river, though the banks still continue

marshy, the now perfectly fresh water enables a varied forest to replace the mangrove and pandanus, and here perhaps the most extravagant development of vegetation may be seen, recalling past geological epochs rather than the poor and mediocre aspects of nature at the present time. This magnificent development of equatorial forest scenery is almost confined to the valley of the Amazons, the West Coast of Africa, and a few portions of the Malay Archipelago, and has been most aptly described in the language, now classical, of our esteemed Secretary, Mr. Bates, in that most delightful work 'The Naturalist on the Amazons.' Here, walls of forest rise 100 to 200 feet into the air from the marshy shore. There is not one prominent kind of tree, but an infinite variety of kinds. There is every type of foliage and every shade of green. At the base of the forest on the water-line grow great Arums of the genus *Cyrtosperma*, with flower spathes of pale green streaked with purple-red. Above the Arums gleam out the white bracts of a species of *Mussaenda*, while higher up another *Mussaenda* exhibits huge creamy-white flowers without any bracts at all, and yet another species of this beautiful genus has blossoms of a vivid scarlet. Over the lower branches of the trees hangs a thick green veil of convolvulus-creepers, dotted at intervals with large mauve flowers. The *Raphia* palms are also a characteristic component of this river-side forest.

Ascending this typical river still further, the marshy banks gradually become firm dry land, and the ground even rises from the water into wooded heights. The native towns, with their pretty landing places at the river side, begin to increase in number and importance. Groups of chocolate-coloured natives peer at you suspiciously from among the boles and branches of the trees, but soon recognise you as a friend and come off in their dug-out canoes, to barter their fowls, yams, and palm-wine. Perhaps, arriving thus far, the channel of the stream has somewhat narrowed and shallowed, and you have exchanged the steamer for a steam launch, or a well-manned boat, or even—as I have done so often—for a good-sized native canoe, in which you will be able to thread more easily the channels of the river, and reach the limit of navigation. Alternating between the thickly-studded villages—between tribe and tribe—will come most pleasant spaces of solitude, where, owing to the constant warfare, which effectually divides each section of these savage peoples, there is an uninhabited neutral ground. Here you are alone with nature, unharassed by the presence of her noisiest offspring, man. Here from the dense green forest depths rings out the bark of the chimpanzee, and monkey families jump from tree to tree with a swish of leaves and a cracking of twigs. Black and white hornbills, with raucous cries, flap heavily across the river, and the lovely blue-green-purple-crested plantain-eater dodges your aim coquettishly among the palm-fronds. Perhaps where the river expands into a broad pool, with an archipelago of golden sandbanks, you encounter a school of hippopotami,

snorting, yawning, splashing, and grunting. If you are in a boat or canoe, you prudently avoid these ferocious beasts, and steer as closely as possible to the bank, because out of playfulness or spite, they would probably try to swamp your frail craft; but of course, in a steam launch you can steer through the midst of the herd without much fear of reprisals. On the sandbanks the yellow-grey crocodiles lie peacefully asleep, and close to them, about them, and around them, are groups of dainty, graceful water-birds who appear to have concluded a pact with the crocodiles that if they act as sentinels and warn the sleeping saurians of the approach of destroying man, on their part the crocodiles will abstain from eating their graceful allies. That the crocodile never eats a water-bird is more than I can assert, but this I do know is a most common feature on African rivers and lakes, that crocodiles and water-birds are constantly seen in close proximity, and that the spur-winged plover and other birds perch on the crocodile's scaly back.

Gradually the river narrows, and the banks increase in height, and red clay now gives place to outcropping rock. Looking interiorwards beyond the vista of the winding river is the exhilarating prospect of a faint blue range of hills. All influence of the tide has ceased, and the current becomes more rapid. It may be hours, or it may be days or weeks before we reach the outlying spurs of the first range of hills, the first ascent to the central plateau. Before we arrive at the actual falls which form an effectual bar to further navigation, there are many rapids, more or less difficult to pass, and in some places one can see where an ancient barrier of rocks has been worn away, leaving on either shore broken masses of stone, like the relics of some old bridge that has disappeared. At length, above the chirping of cicadas, the rustling of the forest, and the monotonous cadence of the boatmen's song, rises a far-off but persistent sound like the noise of a distant train. The native guide holds up his hand to the chanting paddlers, and commands silence; then after listening attentively he turns to you and says, "You hear them noise? We done catch close them place where water live for fall down." All expectation as you are, the windings of the river are tantalising, but at length a turn in the stream shows you the falls, which may be either a disappointing ledge of grey rock marked by a white line of water where the river descends abruptly one or two feet, or a beautiful series of cascades, coursing in many foaming torrents over a broad stairway of rocks. Here your water journey comes to an end, and this is the limit at which so many African explorations stop, but if you are an inveterate explorer, you will leave your boat and take to the shore, and cutting a road through the forest follow the river along its tortuous course, past fall after fall, past tranquil sluggish reaches, then a country of rocks, and then through grassy plains with wild cannibal villages, whose inhabitants you must pacify with your peaceful white umbrella, and your cheerful smile of placid amiability.

Here you are out of the forest-region of West Africa, in the great park-lands of the interior. Your stream, which has just been reduced to a narrow torrent between high walls of forest and precipices of shining water-smoothed rock, expands into a broad, sluggish flow, to whose banks come the numerous herds of the natives' cattle to drink and wallow in the mud; where the long-gowned, turbaned Moslem trader arrives from the north with his horses and asses and guns, to buy slaves of the naked, industrious, cannibal agriculturists, or to steal them or to seize them if the negroes are too weak to resist. This is the fascinating part of Africa—full of history and human movement—the land of wanton bloodshed, of gaudy barbaric pomp, of populous negro towns, of dry grassy plains, flat-topped mountains, clumps of huge sycamores and acacias, and graceful groups of fan-palms—the land where the Moslem robbers ride through the thorny stubble and the maize-fields on long-tailed ragged ponies, where the cannibal negro chief, alternately the ally and the victim of the Mohammedan slaver, shows you the clean interior of his clay-walled dwelling-house, studded with a frieze of a hundred human skulls, where the vultures are as tame as domestic fowls, and have no lack of offal on which to gorge—the land of the lion, the antelope, the ostrich, and the baboon.

Having given you this general description of what it is like to ascend the larger oil rivers and the branches of the Niger, I will now proceed to describe in a more detailed manner some of the important places and districts comprised within the British Protectorate of the Niger Territories.

As no doubt you know, the main streams of the Niger and Benue, with a considerable extent of land on either side, are under the administration of the Royal Niger Company, which, by royal charter, has become a territorial power. The remaining portions of the Protectorate comprising the greater part of the delta—in fact, the country between the boundary of Lagos and the German boundary of Cameroons—is at present administered by Her Majesty's consular officers, under various Orders in Council. The chief port of the Niger Company is at Akassa, at the mouth of the main Niger, and their administrative capital is at present at Asaba, above the delta. The headquarters of the consular establishment is at the important and relatively healthy town of Old Calabar, on an affluent of the Cross river. Old Calabar not only contributes a larger share of the trade than any of the settlements on the Oil Rivers, but it promises from its position and relative healthiness to be an important administrative centre in the future. It has a population of probably 15,000 natives, and about 150 British subjects who are foreigners, of whom over fifty are whites. Some of the Europeans (missionaries) have resided there for over thirty-seven years; two of them are aged respectively eighty-two and eighty-one, and the health of the whites, both in Old Calabar and Creek Town, is generally superior

to that of any other town in the Oil Rivers, or, indeed, in West Africa.

The natives of the Old Calabar district are thoroughly loyal to Great Britain, and very gladly accept its rule. They are ruled over by a number of native kings and chiefs, some of them of long descent and proud lineage, who live in handsome well-built European residences, and on Sundays and feast days dress elaborately in European clothes, at other times and seasons preferring to walk about in scarlet chimney-pot hats or the peaked caps of the mercantile marine, and little else, for nakedness knows no shame in these happy lands. At times, however, the chiefs can array themselves gorgeously in royal robes, crowns, and sceptres, while their chieftainesses put on second-hand dinner dresses of Parisian make, which hang about their supple bodies in deplorable shapelessness, from a lack of the underclothing which would accompany them in Europe. The Calabar women of lesser degree are very slight in their costume, unless they belong to the mission, in which case they wear long blue shapeless gowns that are well suited to the simplicity of clothing which the climate necessitates. But the women of the poorer classes and the slaves confine their adornment to their heads of hair and their skins, which are decorated with elaborate blue tattooing. The Calabar chiefs are also remarkable for their embonpoint, which they are proud to display.

The interiors of the Calabar houses are not devoid of taste, and their architecture gives a faint suggestion of Saracenic, as though originally they had been under the influence of the Niger peoples. Indeed, the arrangement of their houses differs markedly from that which prevails in the Bantu country across the Cameroons border. The Calabar houses are generally built in the form of a square, the narrow apartments enclosing a central patio or yard, open to the sky, in the middle of which a small tree, occasionally hung with charms and "fetishes," is planted. The Calabarese exhibit a decidedly æsthetic taste in their paintings and their brass work. They obtain the brass from European traders, and on it stamp by hand fantastic designs by means of a large-headed nail and a stone used as a hammer. They also do pretty bead-work, and weave elegant dyed-grass mats, and make fantastic masks and head-dresses, which are assumed in their plays and sports, and also in time of war.

The natives of Old Calabar and the lower Cross river belong to the Efik race. In language, and no doubt in origin, they are allied to the Ibos of the Niger Delta. They have scarcely been settled at Old Calabar more than a century and a half. Originally they came from the Ibibio district on the Cross river, and drove out and partly supplanted the Akpa tribe, who originally inhabited Old Calabar. The Efik people are now much mixed in blood, having imported many slaves from Cameroons. They have for more than half a century been to a considerable extent under British influence; and of course of late years they

have placed their country entirely under our political control. Indeed, if you told a Calabar man he was not a British subject, he would be greatly offended. Nearly every man speaks a little English, and not a few of the women can understand our language to a certain extent, and a fair proportion of the Calabarese can read and write it. This is the result mainly of the schools which have been established here for many years by the United Presbyterian Mission and other evangelising societies. Numbers of the young Calabar men go to England either to complete this education or just to see the white man's wonderful country; and the result of their abrupt contact with our civilisation is often amusing. One young fellow, who spent two years at an English school, returned to Old Calabar quite an Anglomaniac, and among other innovations attempted to form a cricket club among his friends and relations. To this end he wrote out in a beautiful neat text-hand an elaborate prospectus, which he circulated round the town to arouse interest and obtain subscriptions. The peroration of this document ran thus:—"The establishment of this cricket club will, I am convinced, redound to the greater glory of God and the benefit of our fellow-man." "English as she is spoke"—or rather written—at Old Calabar is a dialect full of the quaintest errors. One native gentleman wrote to our esteemed medical officer, Dr. Allman, complaining that he "suffered from involuntary emotions and reflex actions"; and a native matron of great respectability, educated at the mission, and somewhat over sensitive as to the frailty of her reputation, addressed to me the following complaint:—"Sir,—I approach your Consulship to bring a complaint against Mr. Blank for *Definition of my Character*." After detailing the improper allegations which Mr. Blank had made, she went on to say, "Now Sir, I am and always have been, *all my life*, a very respectable married woman," which fact, I hastened to assure her, was so well known to all the community, that it would be better to pass over Mr. Blank's ill-natured tattle in silent contempt. And I am glad to say she took my advice.

After all, though one may often good-naturedly laugh at their amusing blunders, there is something very remarkable in the way in which these negroes spring to the contact of civilisation, and hasten to avail themselves of every facility for acquiring knowledge which our missionaries and merchants place in their way.

In the early part of this year I decided to ascend the Cross river for the purpose of making treaties with the natives, and also for surveying its course, of which we knew nothing beyond the hasty sketch made some forty-six years ago by the surgeon of the little *Ethiope* trading steamer. Having no steam-launch at my disposal, I was obliged to make the journey in native canoes, of which I hired three, and fitted up the largest with a small house in the centre for my own lodging. I took with me about thirty Kruboyes. These invaluable native workers

come from the Liberian coast, between Sierra Leone and Grand Bassam. Without their aid, European enterprise on the West Coast of Africa would be at a standstill; for, invariably, the negroes who are indigenous to the land will not,—even the so-called slaves,—undertake any persistent work. The Kruboy is a strong, good-tempered, faithful creature; able to row, paddle, carry, dig, wash clothes, or wait at table, or turn his hand to anything; in fact he is a great deal sharper, defter, and more industrious than the average English navvy.

My first object in going up the Cross river was to settle an outstanding quarrel between the people of a district called Umon and the natives of Old Calabar. Umon lies at a distance of about 100 miles from the sea. The people speak a language quite distinct from the Calabar language. They were, until lately, terribly priest-ridden. Their life was a burden to them with its load of cruel superstitious practices. The last few years, however, since they have come into contact with the missionaries, this state of affairs has greatly improved. As I appeared in the light of a mediator, I was most warmly welcomed. An imposing fleet of eighty large Calabar canoes reached Umon soon after I arrived, and formed a really pretty sight, as they were all painted in brilliant but tasteful combinations of colour, like æsthetic "Noah's arks;" their little houses hung with bright carpets or leopard skins, each canoe being decorated with gaudy banners, and hoisting a Union Jack—for the people of the Oil Rivers are aggressively British in their display of bunting. The crews were most fantastically dressed in gorgeous clothes, with Lifeguardsmen's or policemen's helmets, or native head-dresses of Colobus monkey skin, or of black-dyed filaments of palm-fronds. The beating of drums, the blowing of horns, and the firing of guns made a clamour most disturbing to my comfort, which I promptly stopped. I need hardly say that I had the Calabar people all under control, for there was not only a personal attachment between us, but they knew that I was working in their interest, and the Umon people were much impressed by the way in which my shabby little despatch canoe, with two of my Kruboyes in it, could marshal the imposing Calabar fleet.

As both sides were longing to have their quarrel at an end, and were fully prepared to accept my decision, the conference was a brief one. I decided that it was six of one and half-a-dozen of the other; I made the Calabar people surrender the Umon captives, and the Umon surrender their Calabar prisoners. Peace was re-established, trade was resumed, and I was free to continue my journey. We next visited the important Akuna-Kuna country, very populous, and inhabited by friendly, industrious people, whose chiefs very promptly and willingly concluded a treaty with the British Government, and loaded me with such an abundance of provisions—bullocks, goats, sheep, fowls, ducks, yams, and Indian corn—that our progress was seriously impeded, our canoes nearly capsized, and my Krumen suffered severely from indigestion. Some

distance further up the river we had rather a ticklish task to perform. Another quarrel, and that a bitter one, had to be settled between the people of Akuna-Kuna and the inhabitants of Iko-Morut. Here I was awkwardly situated. Had I been enabled to travel in a steam-launch, I could have gone safely up the river, or in any direction where there was sufficient water; but travelling simply in native canoes, the inhabitants of these wild countries in the interior, who look upon every stranger as an enemy, had no idea that a white man was visiting them, and often proceeded to attack us before I could make myself seen.

As soon as we came in sight of the stockaded villages of Iko-Morut, many excited chocolate-coloured natives could be seen hurrying along the banks of the stream and posting themselves in ambush behind the trees. Then first one gun, then two, three, four guns, went off; then there was a regular hail of slugs and stones, whipping up the surface of the water, and in one or two cases whizzing over our canoes. In the face of this warm reception it would have been impossible to proceed, for, at any moment, a shot might strike our canoes and send them to the bottom. As to returning the fire of these poor stupid savages, nothing was further from my thoughts. It was always open to me to retreat, while unless I could proceed peacefully, and with a friendly reputation preceding me, it was futile to continue my ascent of the Cross river. So I had the canoes steered to an unoccupied sandbank in the centre of the stream, and as soon as the natives saw that we stopped they ceased firing. Then I got into my small despatch canoe with two interpreters, hoisted my white umbrella and assumed my smile, and quietly landed on the crowded beach, to the silent amazement of the natives, who were armed to the teeth. I was conducted to the chief, who, for a long time could not be prevailed upon to see me, on account of my presumed powers to bewitch him; but a little friendly conversation through the reed screen of his apartment, and the hint that I had brought a pretty present, reassured him, and we soon made excellent friends.

To make a long story short, the result of my stay at Iko-Morut was equally satisfactory to that at Umon; I made peace between Akuna-Kuna and Iko-Morut, and the chiefs of the latter place concluded a treaty with me. Then on, beyond Iko-Morut, day after day, we paddled up the beautiful stream, sometimes received by the natives in a gush of friendliness, sometimes sullenly avoided, sometimes boisterously attacked. At length, in the heart of the cannibal country, on the outskirts of Atam, where the Cross river attains its furthest reach to the north, our journey came forcedly to an end. I had several times been captured and released, several times fired at and then hugged by those who had attacked me, but the strain was becoming too great for the nerves of my Kruboya.

As we approached one village, a shot, better directed than usual, went through the roof of my little "Noah's ark," and although no doubt

our ultimate reception at the village would have been the same as at the preceding ones—first sullen hostility, then timid inquiry, and lastly cordial hand-shaking and hugging, and the giving of presents—still before this happy consummation came about, some of us might have been accidentally killed, or our canoes—our only means of regaining civilisation—sunk or disabled, consequently I decided to turn back. Then ensued an awful afternoon, when for miles and miles we had to run the gauntlet past populous villages of cannibals, whom we had had much difficulty in avoiding on our ascent of the river; and who, taking our retreat for a flight, seemed bent on capturing us or plundering our canoes and eating the wretched Kruboyas, who turned blue with fright at the prospect of being eaten, as they desperately paddled down river past shrieking natives, who waded out into the shallows, or pursued us in canoes. Every now and again we would stick on a sandbank, and the shouts of the natives would come nearer and nearer, then we would get off again, and paddle for our lives, then stick again, and so on, till at last we were out of this savage district. I hesitate to say hostile, for, wherever I landed, or was captured, I was always well treated as soon as they found out what I was like and what my objects were in visiting their country. At length we arrived in the delightful district of Apiapum, where we put up for a week at the clean and comfortable town of Ofurekpe, whose chief and people were some of the nicest, kindest, most friendly folk I have ever encountered in Africa, although they were in their own practical way cannibals, like their neighbours—that is to say, they were given to eating the flesh of all whom they might catch in war. I did not here observe that other kind of cannibalism which I have occasionally met with on the Upper Cross river, which is of a sentimental character, namely, where the old people of the tribe, when they become toothless and useless, are knocked on the head, smoke-dried, pounded into a paste, and re-absorbed into the bosom of the family.

On the Upper Cross river there is a direct contact with the Mahomedan Soudan, and in the country of Atam, horses have been introduced from the north. Interesting to me as the Cross river district is, I cannot here dilate any further on its features, but must continue my review of the remaining part of the British Protectorate of the Oil Rivers.

Westward of Old Calabar, the first important trading centre we come to is Opobo, on the Opobo river, the right and left banks of which stream, near its mouth, are occupied by a flourishing European settlement, and about five miles from the sea is the not very large, but closely packed and squalid native town. The Opobo river leads one into the heart of the Opobo country, inhabited by the industrious Ibo race, which occupies the lower Niger, just above the delta, and extends thence to the right bank of the Cross river. The Ibos are cannibals, but their cannibalism is not of a ferocious type, and rather seems to mean the occasional eating of superfluous slaves, or the celebration of sacrifices

on the death of a great man. The Ibo country is densely populated. Their towns are of a very distinct character, with rectangular houses well built of clay and thatch, interspersed among groups of magnificent trees, which are purposely preserved and cultivated by the citizens. Among these are noticeable *Dracenas* of great height, with red trunks and dark green spiky fir-like foliage. The Ibo towns are never crowded, each house or little group of houses standing by itself in an independent compound. The open spaces in the town are kept scrupulously clean, being frequently swept with brooms made out of twigs and palm-fronds, which are industriously plied by the boys and youths who keep the town in order. In the vicinity of this settlement, there are dense groves of the oil-palm, and thriving plantations of maize, yams, beans, and colocasia arums.

The Ibos are exceedingly industrious people. They weave grass-cloth, and display a very marked æsthetic taste in the designing of their implements and textile fabrics, and in the interior decoration of their houses, in all of which, and in their social arrangements, they are greatly superior to the degraded coast tribes, who seem to have lost their ancient culture, and have not yet become thoroughly imbued with European civilisation. They are clever smiths, and make a good many implements from the iron which they smelt themselves from the soil, in their primitive forges. The Ibos I look upon as the promising tribe of the delta. It is they, at present, who create the trade; Ijos and Kwos—their neighbours on the south and west—are but middlemen, non-producers. The Ibos are industrious agriculturists, and have fine herds of cattle, goats, and sheep, and quantities of fowls and ducks.

Westward of Opobo, on the left branch of a large delta, is the old and important town of Bonny, which has been known to Europeans some two hundred years, and whose present reigning chief is the descendant of a family which has ruled Bonny continuously for nearly the same period. Although in some respects Bonny, from the great facilities it offers as a harbour, promises to be one of the chief places of the delta, yet it is at present far behind Old Calabar in size and good condition. The native town is a foul, unhealthy collection of native huts and ludicrously ugly imitations of European houses roughly put together with bits of corrugated iron, deal planks and crumbling bricks. The various towns of the district known as New Calabar, and of Brass, are somewhat better built, larger and cleaner than Bonny, but their general character is the same. Okrika, where the recent massacres and outbreak of cannibalism have taken place, is a particularly dirty warren of a place, about 20 or 30 miles north of Bonny. Behind the town of Okrika, however, is good firm land of red clay, covered in parts with rich forest, in others affording good pasturages for the large herds of cattle kept by the Okrika people. Okrika is but a short distance from the large Ibo town of Bende, the centre of the local slave and ivory trade.

The district which lies between the Middleton river on the west, and the Andoni river on the east of Bonny, and including the extreme lower Niger, is inhabited by the large Ijo tribe, who are further connected linguistically with the Sobos, who inhabit the country between the Benue river and the Wari branch of the Niger. The language of the Ijos—which has about six dialects—and the related speech of the Sobos are rather remarkable; they are utterly dissimilar to the surrounding languages, and, as far as we yet know, only offer a vague resemblance to certain languages on the Upper Niger. It would seem as though the Ijos represented an ancient migration into the delta, which has been cut off and circumscribed by relatively alien races, such as the Ibos, Kwos, and Jekris, on the north, east, and west. The Ijos represent to-day the ruling people of the extreme lower Niger, of Brass, of New Calabar, Bonny, and Opobo. In times past they were fanatic adherents of a savage type of animistic religion. Like the majority of the Africans, they did not know or conceive of the existence of one supreme God, but embodied a number of natural principles in the forms of certain animals, or in a concrete representation of “fetishes” or idols.

Each little community had its “totem,” or sacred animal, in whose species, the ancestral spirit—the soul of the tribe, so to speak—was supposed to dwell. Thus, in Brass, they worshipped the python snake; in Bonny, the monitor lizard. Only nine or ten years ago this animal worship was so real that the British authorities in the Oil Rivers were compelled to afford it a certain amount of recognition. Europeans were forbidden to kill the sacred lizard of Bonny, or the still more sacred serpent of Brass, and were heavily fined by their consul if they infringed this prohibition. On one occasion, in Brass, some ten or eleven years ago, an agent of Messrs. Hatton and Cookson’s firm found a large python in his house, and killed it. When the misdeed became known, the Brass people made a descent on the factory, dragged the agent out of the house on to the beach, tied him up by his thumbs, spat in his mouth, and inflicted other indignities on him. Then they broke open the store and took out about 20*l.* worth of goods, which they confiscated. The British Consul hearing of the disturbance, arrived in Brass, considered the case, and was unable to afford the agent any redress, because he was supposed to have brought the punishment upon himself.

At Bonny the monitor lizards became a sickening nuisance. They devoured the Europeans’ fowls, turkeys, ducks, and geese with impunity; they might lie across the road or the doorways of houses with their six feet of length, and savagely lash the shins of people who attempted to pass them with their whip-like serrated tails, and if you wounded or killed one of them, then there was no end of a to-do. You were assaulted or robbed by the natives, harangued by the Consul on board a man-of-war, and possibly fined into the bargain. In other parts of the delta it might be the shark, or the crocodile, or some water-bird that

was worshipped, but nowhere was this zoolatry carried to greater lengths than at Bonny and Brass. For its effectual abolishment, which has been of the greatest benefit to the well-being of Europeans and natives alike, we owe our thanks not to the intervention of naval or consular officials, nor to the bluff remonstrances of traders, but to the quiet unceasing labours of the agents of the Church Missionary Society, who, by winning the natives from these absurd practices, have brought about such a change of affairs that now the python is promptly killed at Brass whenever it makes its appearance, and the monitor lizard is relegated to the woods and swamps. Indeed, as regards the latter animal, there was rather a curious revolution of feeling. About four years ago, when Bonny Town was infested with numbers of these great sluggish lizards, the missionaries screwed the courage of the Bonny converts (who then meant almost the entire population of the place) to the sticking point. A grand slaughter of lizards was arranged to take place on Easter Sunday. As soon as the morning bells of the mission church rang out, a large number of Bonny men and boys armed themselves with matchets and sticks and commenced the slaughter of the lizards. By the end of the day there was not one left alive in the town, and so great were the numbers slaughtered, that the stench almost brought about a sickness, and for four or five days the town was unapproachable. But in slaughtering the lizards, much else of the old superstition seemed to go, and that event marked the real revolution, and a turning towards better things on the part of the Bonny people. A change almost similarly abrupt put an end to the python worship at Brass. Before that time, if a python seized a child in the streets in its coils, and slavered it with its viscous saliva, the mother—so far from interfering to save it—must stand by and call out her thanks, and summon her friends and relations to rejoice with her that the god-python had so honoured her family as to devour her child.

The Ijos and Ibos, and indeed most of the tribes of the Niger, were, not long since, inveterate cannibals, and cannibalism is far from being extinct even in the midst of such civilised centres—with their churches and schools and factories—as Bonny and Brass, and New Calabar. Again and again the news reaches us that in towns where we had really thought that civilisation had obtained firm hold, there has been an outbreak of cannibalism—witness the eating of human flesh by native Christians at Brass some three years ago, and the recent horrors reported from Okrika. Cannibalism is deeply associated with, and indeed forms part of, the ceremonial of the old fetish rites. The “Ju-Ju men”—the native priests—are bound to eat human flesh at certain times and under certain conditions. To procure this needed flesh, the Ju-Ju men are said to disguise themselves at night as leopards and prowl about the byways of the town, where they seek out victims, not among the townspeople, their own countrymen, but among strangers of another

tribe who may be sojourning in the town, and who are imprudent enough to be out of doors at night. Indeed, in Africa, a great licence is permitted at night. In the dark there is little distinction drawn between the lawful acts of a devil and the unlawful deeds of the mere human, the border-line with the poor superstitious African being so vague; and what with the fear of these were-wolves and the dread of malicious goblins, the African dreads to leave the shelter of his house or compound or the cheerful circle of his "club" fire after nightfall; and I have frequently taken advantage of this feeling to cross disturbed districts at night, knowing that, however much the natives might struggle to oppose me in the daylight, they would be very wary of attacking me at night. I have seen some of these human monsters—these Ju-Ju-men—at Okrika and at other places in the delta; they have shown me their long, claw-like, uncut nails, which they and all professional cannibals are supposed to retain for the purpose of tearing to pieces the meat of their cannibal repasts.

West of the main stream of the Niger we pass a number of shallow outlets, all of them with bad and difficult bars, and all interconnected with each other, with the Niger, with the Wari, and with the Forcados. This part of the delta is almost unknown at present. The natives, who seem to be a mixture of Ijos and Jekris, are savage cannibals.

The Forcados river, which is the main outlet of the Wari branch of the Niger, is a noble stream, with a safe and relatively deep bar. The shores of its lower course are almost free from marsh and mangrove, and offer firm, dry, and rich soil, which is at present overgrown by magnificent forest. The mild and timid inhabitants of its lower course belong to the great Jekri tribe, which is the ruling race on the Benin river, and right along the coast to Lagos. Nana, governor of the Jekri country, is an hereditary satrap of the King of Benin. He is one of the most enlightened chiefs in the Oil Rivers. His town, which contains some very good houses, has been designed and built, in a great measure, according to European ideas. The trade of the Benin river is very large, as it forms the débouché of the wealthy Benin country—a land known to English adventurers as far back as 1553, when we find that British traders first visited the Benin river for the purpose of buying the so-called "pepper," the seeds of a species of amomum, which were largely used in the middle ages for the purpose of making spices.

I have explored the main stream of the Benin river for a certain distance inland, and I have found a point on that river from which Benin city is distant only fifteen miles, an improvement on the old round-about way by Gwoto, which involved a long and difficult land journey.

The people of the Jekri country are in some respects superior in local indigenous civilisation to the inhabitants of the rest of the delta, and have a considerable show of wealth, which is manifested especially upon their persons, for the freemen and wealthy slaves wear the most mag-

nificent silks, which are specially ordered for them from Europe, and they are also especially fond of coral. It is not an unusual circumstance to see Nana and some of his big chiefs with over 100*l.* worth of coral on their persons.

The climate of the Niger Delta resembles that of other parts of the West Coast of Africa within the same distance from the Equator, except, perhaps, that it is more rainy than the districts to the west and south; nevertheless, although the local conditions of each part of the delta influence its salubrity, still it may be stated generally, that the climate of the Niger Delta is less unhealthy—that is to say, there is less loss of life among the Europeans—than in our other West African possessions. The temperature is very equable; it is rare that it reaches a greater height than 90° in the shade, and the thermometer seldom goes below 65°. More generally, the temperature night and day ranges between 75° and 87°.

The greatest danger to health in tropical climates, or at any rate in Tropical Africa, occurs from catching cold. Two other imprudences next to be guarded against are excesses of any kind in eating or drinking, or exposing oneself too much to the direct rays of the sun. Errors in diet are promptly and pitilessly punished with sickness; and whereas Europeans are all the better in health for taking a good deal of exercise; they are easily liable to get sick if they expose themselves to the sun's rays without the protection of an umbrella, which is frequently done by new-comers out of foolish bravado. Remembering these three injunctions I have given, it is by no means a difficult matter to keep one's health in the Niger Delta. I am acquainted with numbers of Europeans there—the majority in fact—who by living reasonable lives have no ailments to complain of; but as it is only the clamours of the unhealthy and the imprudent that reach our ears, we are too apt to conclude that the complaints of the few indicate the sufferings of the many.

As this rich country becomes opened up by commerce, as the marshes are drained and filled up, and the too dense forests thinned and cut down; as we penetrate more and more to the healthy interior and are able to supply Europeans with comfortable houses and with all the necessaries and luxuries of civilisation, such as can be procured in the East and West Indies, so the exaggerated fear of the Niger climate will become dispelled, and we shall find it no more difficult of exploitation nor unadapted for European enterprise than the other tropical possessions of the British crown.

The paper was illustrated by a series of twenty-seven views of scenery and natives, shown by the dioptric lantern.

After the paper,

The PRESIDENT expressed, in the name of the Society, his thanks to Mr. Johnston for his extremely interesting and valuable addition to the knowledge of the Niger Delta, which was now being opened out to British enterprise and civilisation.

The Key, or Ké, Islands. By Captain G. LANGEN.

Map, p. 812.

ON June 11th, 1885, we came in sight of the Key Islands. On our nearer approach the next morning, we were struck by the beauty of the scenery presented by the numerous small islands, covered, down to the water's edge, with luxuriant forests. The morning being very clear, we could distinctly see the higher elevations of the largest island of the Key group. "Great Key," which, like "Little Key," is covered with forest.

At 8 a.m. we came to an anchor off Doelah, in Toeal Bay, in order to await the arrival of the Dutch Government official, who, in his office as harbour-master, had to examine the ship's papers.

About thirty native rowing-boats of large size accompanied the Government official, each carrying a chief of the respective district or village, who was rowed by about 30 or 40 natives, while in the bows of each boat two or four richly-dressed natives performed the customary war dance, under a monotonous beating of small drums. Each boat exhibited a rich display of bunting, showing the Dutch ensign at the masthead and the district flag aft on a flag-staff.

At the first sight of these gaily-dressed boats, and hearing the hissing noise of the rowers, the dancers in the front part of the boat brandishing large-bladed knives (the handles of which were richly ornamented with tassels formed of feathers and goats' hair) and making the most ridiculous movements of the body, we feared that war had broken out, and remained in doubt until, on the arrival of the harbour-master, we were informed that the natives had perceived our steamer the night previous, and as the Resident of Amboina was expected on a visit, the natives had mistaken our boat for the Government cutter, which is used by the Resident on his voyages of inspection to the different islands under his charge; and that, in order to welcome their "Toewan Besar," the chiefs of the surrounding districts had met in state.

We came to anchor at "Toeal" at 10 a.m. on June 12th, and I was heartily welcomed by all the colonists, amongst whom I had arranged to stay a long time, during which I took great pleasure in making myself acquainted with this almost unknown group of islands.

The Key, or Ké, Islands derive their name from the native word Ké (pron. Kay), which signifies "What do you say?"; the native tradition runs that, when Macassar traders first landed there and inquired in the Malay tongue after the name of the land they had set foot on, the Key natives answered "Kay," which expression was mistaken by the questioners for the name of the islands; and under this name, which has been changed into "Key," or "Ké," we find them on charts of the East Indian Archipelago.

The islands are very incorrectly laid down on all nautical charts, and my brother, Captain A. Langen, has taken great pains in drawing up a map according to his own survey, which I give in illustration of this paper. The group consists of two larger islands, of which the westerly one bears the name of Nuhu-roa, or Little Key, and the easterly one Ju-ud, or Great Key, surrounded by a number of smaller islands.

There is no doubt that Great Key is geologically much older than Little Key and the other surrounding islands; it possesses elevations of from 2000 to 3000 feet, whilst Little Key and the other islands are very low. Great Key principally consists of a rocky and volcanic formation, whereas Little Key and the surrounding islands are formed of coral and interveined by flint and quartz. The traveller will find on the highest inland elevations of Little Key (200 feet) shells of various species greatly damaged through long exposure to wind and weather.

About thirty-five years ago, according to the most reliable chiefs, Little Key was raised out of the sea during the shocks of a severe earthquake attended by a tidal wave; since then no earthquakes occurred until 1884, in the month of April. The members of the European settlement report that the day opened sultry and stifling, the sun shone till about 9 a.m., when the sky became overcast, and at 10 a.m. the first shock was felt, which caused our saw-mill, then in course of erection, to sway to and fro. No sooner had the workmen felt this first shock, than they rushed out of the building, and after a short lapse of time two more slight shocks were felt, but fortunately without doing any serious damage.

About half an hour's walk eastward from Doelah, is an extinct crater, filled with fresh water, of a great depth, and of a very dark blue colour.

Every island belonging to the Key group is covered, down to the water's edge, with dense tropical jungle, gigantic creepers winding themselves from one tree to another, thus forming a close network and great impediment to travelling. These forests contain choice kinds of timber, which formed one of the principal inducements for the establishment of the present German colony.

On nearing the Key group from the westward, vessels must be careful in not rounding Blair and Mass Islands too closely, as the reef projects out to the eastward about five miles, covered at low water, and on the outer edge of which reef the lead will indicate deep navigable water. After having gradually rounded this reef, it is best to keep the flag-staff of Doelah a little on the port bow, as this will give to the navigator a good and safe fairway. When abreast of Doelah the vessel's head must be steered towards the middle of the island of Oboer, where a white landmark has been placed as guide to vessels bound for Toeal. This course is retained until the saw-mill of the European settlement opens out on the port bow, when, by gradually allowing the vessel's head to be

borne up to it, she can be steered right for the building, only taking care in keeping the black buoy on the port side and the red one on the starboard side, thus clearing two reefs lying opposite each other and a little to the south end of Oboer.

These buoys are placed on the outer edges of the two reefs, and lie in 12 fathoms of water. The mid channel indicates depths of water varying from 8 to 12½ fathoms at low water. After having passed these two reefs, the vessel is kept close to the left shore, until she gets nearly abreast of the pier belonging to the European settlement, where she can come to a safe anchor in 10 fathoms of water on the ebb.

By anchoring close on the left shore of Toeal Bay, the vessel does not expose herself to the strong current sweeping around Toeal Point from the southward and cause her to drag the anchor, as I have seen vessels do when being anchored too far towards the middle of the bay. It appears that the anchoring ground is too soft, and does not hold well.

Toeal offers a much safer anchorage during the prevalence of the south-west monsoon than Doelah, where the sea rolls in very heavily during those months, namely from December till the end of March, exposing the vessel when dragging to be wrecked directly, while Toeal, surrounded on all sides by land, does not permit a heavy sea or swell to endanger the vessel at anchor. The view from Toeal, over the harbour, much resembles, with the exception of the hills, the outer harbour of Sydney in New South Wales.

Besides the anchorage at Doelah and Toeal, the south-east coast of Doelan Laut offers a good and safe anchorage during the north-east monsoon. On Great Key we find the anchorage of Eli and Haar only safe during the south-west monsoon, while Vur could be used with perfect safety during the east monsoon.

The tides are very remarkable amongst this group of islands, there being a rise and fall of only 10 feet at the greatest neaps. The tide floods in the middle of the bay while the ebb is still running along the edges of the coast, thus causing no stand-still, or dead water, as the sailor terms it. At full and change the neaps are strong, whereas the flood is not great; while during the intermediate time the flood is the strongest and the ebb small. As a rule the flood during night-time is stronger than at day-time, and again stronger in the west monsoon than during the prevalence of the east monsoon.

On neither Great nor Little Key are there many streams of fresh water, forming small rivers, or brooks, and yet there is no want of water for cultivation.

During the south-west monsoon, which as a rule sets in towards the middle of December, with boisterous weather and strong continual rains, lasting until the end of March, the accumulation of rain water, running down the hills, forms small rivers and brooks during these months, and which find their way to the sea; but as soon as the rain abates, at

the beginning of April, these dry up quickly by the scorching sun. With the beginning of April the change of the monsoon sets in, the weather becomes finer, the temperature warmer, and calms, alternating with light variable breezes, announce the setting in of the north-east monsoon; generally towards the end of April the same has fairly set in, and which, although not blowing very strong, occasionally accompanied by a refreshing shower of rain, renders the heat less oppressive.

The heavy dew which falls during the night, especially during the months of June, July, and August, as well as these occasional showers, keep the ground moist, and thus afford ample nourishment to vegetation. Towards the end of October the north-east monsoon abates, on account of which October and November are the hottest months in the year, during which vegetation suffers by drought.

With the beginning of November the north-east monsoon has become very light; calms and light variable winds set in until, towards the middle of December, the south-west monsoon indicates its approach by heavy rain-squalls and westerly winds, accompanied by very heavy thunderstorms.

The soil not being of great depth, permits the rain-water to percolate quickly through to the coral. The traveller will therefore meet with only a few patches of marshy soil on the islands; but he is astonished at the luxuriant growth of vegetation, at the gigantic and stately trees spreading their roots, on account of the coral and stony formation above ground, to seek a firm hold around the coral, out of whose porous texture the fibres of the roots obtain their necessary nourishment; and no place will be found on the Key group which is entirely barren and destitute of vegetation.

The following table will show the average rainfall of each month, the number of dry days, together with the average stand of barometer and thermometer, according to my personal observations during my stay on the Key Islands:—

Month.	Rainfall in inches.	Number of Dry Days.	Average Height of Barometer.	Average Height of Thermometer.
January	12.4	7	Varied from 29.70-29.90.	Varied from 80°-90° in shade.
February	14.4	2		
March	18.9	12		
April	11.5	11		
May	3.2	10		
June	2.7	8		
July	2.6	9		
August	2.5	5		
September	3.9	5		
October	5.7	11		
November	10.6	10		
December	14.1	4		
	102.5			

The rocky nature of the ground renders it also very difficult for the natives to obtain everywhere an ample fresh-water supply, and there are many villages where no water is obtainable, the inhabitants having to go a long distance in order to obtain this necessary liquid. Generally the fresh-water wells are situated close by the sea (this refers especially to Little Key, and its surrounding islands), and at not too high an elevation; for to endeavour to strike water on a hill is quite useless work, as the same is only obtainable when at the sea-level; there is also no need for constructing a large or dry well, for when once on a level with the sea the continual accumulation will supply any quantity.

It is strange to observe that at flood time the water in these pits stands much higher than at time of ebb, and also that the water in wells from 200 to 300 yards distance from the sea is of a saline nature, while those of a farther distance furnish good and healthy drinking water. But all fresh water obtainable on these islands contains lime in large quantities; and my conviction is that it is only on account of the natives availing themselves of the use of strong acids, such as of lemons and oranges, that the drinking of such water proves harmless to them.

It is evident, therefore, that the sea, in filtrating gradually through the pores of the coral, becomes purified and separated of all its saline ingredients on its way to the wells; and those places on the islands where no water is obtainable are such where the ground is of a flint and quartz formation.

On the west coast of Nuhu-roa, and half-way down, is a large bay, running very narrow opposite the village of Totoat, winding its way in a southerly direction until, when reaching the south end of Nuhu-roa, it loses itself in three marshy unnavigable arms, which at time of low water are perfectly dry. When proceeding from Totoat down this bay in a southerly direction the traveller will meet on both sides low land, covered at the water's edge with gigantic mangrove bushes, until after an hour's rowing the coast to the left rises to an elevation of about 50 feet, from which height large quantities of the coolest and most refreshing water are seen falling over the rocks at a very rapid pace down to the bay. This torrent is the only permanent running stream found on the islands, and it is strange to observe that the quantity of water it pours into the bay keeps the same during both monsoons.

On the slopes of the hill the brook is found to be about eight to ten feet wide, pouring a great volume of water down its rocky bed. It winds about through the rocks, and the overhanging and thickly entwined creepers render it impossible to wade through in order to find the spring which yields such an abundant supply. A native guide to the source may be obtained from a neighbouring village. The source is on the highest elevation of Nuhu-roa; here the vast volume of delicious fresh water is seen welling forth from a chasm in

the rock. There must exist a deep-seated basin in which this water accumulates, and it may perhaps lie under Great Key or the more distant New Guinea.

There is ample proof that, long before the Dutch gained possession of this group of islands, they were visited by vessels of other European powers. English names exist among the natives, most likely out of fancy transferred to persons. Old brass man-of-war guns, greatly varying in size and shape, are used in trading as a substitute for money amongst the different districts, in the same way as the natives of the Carolines use a certain kind of round-shaped stones in place of coin. These guns date more than a hundred years back, and belonged, judging by the inscriptions and engravings thereon, to the Spaniards and Portuguese. The French also, according to the accounts of the most trustworthy chiefs, have navigated in these waters; and although the Germans, to my knowledge, have never visited these parts in former years, yet the first European settlement was the recent one of German origin, and Germans are the first colonists.*

In the year 1645 a treaty for the cession of the group was arranged between the chiefs and the Netherlands India Company, and after a revision of the contract twenty years later, the islands fell under the sovereignty of that company. Since 1882 the Netherlands India Government established and strengthened its claim to the group by placing an official at Doelah, whose duties are to keep peace amongst the natives, and settle their disputes and quarrels; and lately, so we were informed, his jurisdiction has been extended to Europeans of the settlement to a certain extent. These Dutch "Post-holders" are men who have either been in colonial military service, or who have passed a number of years amongst the natives, and thus obtained minute acquaintance with their customs, &c. The tribal laws of the natives are upheld by the Netherlands India Government, and it is only newly appointed chiefs who have to be sanctioned by the Resident of Amboina, who furnishes a certificate of office to each.

The islands are divided into different districts, each comprising a certain number of villages with their surrounding land; each district has at its head a principal chief, termed "Rajah," of whom there are nine in Little Key with the surrounding islands, and nine in Great Key.

Each Rajah has, in the principal villages of his district, certain under-chiefs, such as the Orang Kaia (who is next in rank), which signifies spokesman, and whose duty it is to bring before the Rajah the wishes of his subjects; next in office follows the "Major," who acts as magistrate; the "Capitan" ranges next in rank, and this chief is supposed to be the general in case of war; under him stands the "Orang-

* Mr. A. R. Wallace spent a few days in the Ké Islands in 1857, and gave an interesting account of their natural productions and the boat-building industry of the inhabitants. The group was also visited by the *Challenger* in 1874.—[Ed.]

Tua," signifying the oldest or the most experienced man of the respective village; the lowest degree is "Maringo," who performs the functions of a policeman.

All these offices are hereditary through the eldest sons of the respective families; if there is no successor, a new chief is elected by the natives of the district, who need not to be recognised by the Netherlands India Government. A chief receives no payment, but after having been acknowledged and established in office by the Resident of Amboina, he is presented with a silver mounting for his walking-stick, on which is engraved the Dutch coat-of-arms. After he has held his office for a term of twenty-five years with faultless conduct and loyalty, the silver mounting on the walking stick is replaced by a golden one. If a chief has rendered an extraordinarily praiseworthy service to his Government, he is presented with a fanciful, richly ornamented umbrella, which his servant carries before him, when he walks abroad, to prevent the sun from tanning his face.

About four years ago, a disturbance arose between the natives and the Europeans, the former having planned the massacre of the white settlers. My brother, Captain A. Langen, took all necessary precautions at the European settlement, and watch was kept with loaded rifles night and day. He managed to persuade the "Orang Kaia" from "Doelan Laut" to carry a letter to Banda, in which he requested the Resident of Amboina to send a man-of-war to assist the Europeans in their danger. The required assistance was granted and the dispute settled, which arose through one of the European labourers insulting the "Major" of Toeal, a person of unsound mind, by throwing ashes on his dress, when requested by the former not to stand in his way.

In 1870 the total population of the Key Islands was estimated at 21,000 people; 6000 forming the population of Little Key and the neighbouring smaller islands, and 15,000 that of Great Key. According to the last census, which was taken in 1881, after the last traces of small-pox had disappeared, the population of the total group amounted to 19,456 people.

About one-third of the population are Mahomedans, who are greatly increasing every year, owing to the influence of Arabs and natives who have returned to Key as "Hadjis" from Mecca. These men are worshipped to a certain extent by their inferior-stationed fellow-believers, and exercise their influence on the latter in such a degree that they are kept for the remainder of their lives in food and clothing.

One of these influential Arabs, named "Habib," aged about sixty, who died a few months ago, had exercised, within a short period, his religious influence to such an extent and to such personal advantage, that the natives buried him in the Mosque at Toeal, and erected a large and magnificent gravestone to his memory, at the foot of which,

every day, several natives may be seen praying. A small oil lamp is kept burning all night, very likely to guard off the bad spirits. I have witnessed this same Arab baptising several Hindus from Toeal, natives who were brought over to Mohammedanism by large presents, consisting partly of goods, partly of money, and, according to report, the sum paid for a whole family (Hindu) on becoming believers of Mahomedanism amounted to 600 florins.

During 1887 these Arabs, in connection with the principal and most fanatic Hadjis, succeeded in converting to their creed several of the principal chiefs, and even at the present moment they are bargaining about the sum to be offered to entangle the wife of one of the staunchest Hindu Rajahs of the islands.

Such proceedings on the part of the Mahomedans is not only leading to great discontent and uneasiness amongst the Hindu natives, but they prove a great disadvantage to the European settlement, and if no check is put upon them by the interference of the Government, they may prove dangerous.

Before our colony was established, coin was unknown to the natives, trade being carried on by exchange of goods which Macassar traders brought over in order to buy timber, trepang, tortoise-shell, &c., and the Mahomedans, for want of ready cash, were prevented from undertaking the pilgrimage to Mecca; but no sooner had the natives learnt the value and use of coin, than several managed to beg together a sufficient sum to enable them to travel to the shrine of their great prophet. These required funds (for each pilgrim must show to the Government official a sum of 200 fl.) are not at all times the property of a single individual, but are collected in the village to which he or she belongs. Every year during my stay the number of pilgrims increased, and I am informed that at present there are 14 natives awaiting the arrival of the mail to embark on their way to Mecca. The Mahomedans of the Key Islands are not all natives; most of them are descendants of fugitives from Banda, Ceram, and Amboina.

I distinguish three principal races in the islands, namely:—

1. The original Key native.
2. The New Guinea, or Papuan negro.
3. Natives from the Banda Islands.

The indigenes of Key are tall, strongly built, the forehead broad and slanting backward, dark eyes with heavy black lashes, a large but well-shaped nose, high cheek-bones and broad mouth, with the under lip more or less projecting, black and brown coloured beard and long, wavy, but fine curled black hair, mixed with several lighter or darker shades of brown, reaching to the shoulder and projecting all round the head similar to a mop. Their skin is rather dark but of a lighter hue than the Papuans of New Guinea. Formerly their clothing was the same as that used by the Alfueros from Ceram and Borneo; but

since the establishment of the European colony, which attracted more traders from Macassar and other parts of Celebes, their wearing apparel as well as mode of living in general has undergone a change by the addition of many small luxuries before unknown to them.

Pulo Papoea, which lies to the south-east of Toeal, was in former days inhabited by natives from New Guinea. Continual fights amongst these negroes and the natives from Key determined the latter to expel and thus rid themselves of their enemy, in which they succeeded. But notwithstanding this deep enmity the two races became intermixed by marriage, and consequently we meet here with a tribe of strange peculiarity. Of the present population, some adhere to Mahomedanism, while the most of them have remained Hindus. This mixed race is found on all parts of the Key Islands, and is distinguished by the black curly hair, which attains a greater length than that of a real Papuan; the nose and mouth are broader than in a real Key native, the lips are more projecting, while the bony frame in general indicates the offspring of intermarriage between the two races. The hands and feet are also much longer and of a coarser shape in comparison to those of a pure-bred Key native, and the skin is of a much darker colour. Those natives who have descended from fugitives and emigrants from Ceram, Banda, and Amboina, are almost all Mahomedans and are generally of much lighter colour, smaller in stature and of a finer build, their hair being black and long, and their teeth smaller, better shaped and more regularly set, in comparison with the above-mentioned races.

The natives live in huts built on poles of strong and hard timber or thick bamboo; very few houses, such as those inhabited by the principal chiefs in some of the larger villages, such as Toeal and Doelah, are built entirely of timber.

The reason for building the houses or huts on poles, about four to six feet above ground, is in order to prevent the swarms of vermin during the prevalence of the south-west monsoon from entering the house; and partly also to allow a free current of air through the flooring, which consists of split bamboo matting, and by these means keep the interior of the rooms cool during the north-east monsoon.

Some of the huts, inhabited by Hadjis, are adorned with a front verandah, giving the exterior a more pleasant appearance. The sides of these houses are covered-in either by *attap*, consisting of the dried leaves of the sago-palm doubled over a small bamboo about six feet in length, and laced tightly to it by means of split cane, in the execution of which workmanship a native displays great patience as well as skill; or with the stems of the same palm-leaf, which, after being dried and deprived of its thorns, are placed between two boards in a vertical position and in such a manner that the hollow part of the stem fits tightly over the half-rounded part of the succeeding one. In

this way a very light but water-tight outside covering is formed, and gives to the house a not unpleasant appearance, as these dried stems exhibit a brown gloss, just as if polished. The above-mentioned attap is used as material for roofing, and if well and carefully executed this covering will last at least three years.

These houses or huts vary greatly in size, according to the number of people they have to shelter; most of the chiefs have their whole family living with them, upwards of twenty people.

The interior of a house is generally divided into different parts, the doorway, forming the middle of the front, leading into a spacious room, which represents the reception room for visitors. On the floor of this reception room, covered with split bamboo matting of rather wide meshes, are seen spread out other mats, manufactured of some kind of fine grass or bark, and belonging to each mat there is a bolster, with bright-coloured calico-print covering, the ends ornamented by embroidery. From each side of the reception room are openings leading into the other rooms, the partitions being constructed of the same material as the outside covering. These rooms are divided into sitting and bed-rooms, more or less ornamented by a display of fancy coloured boxes, manufactured by natives from Ceram and Timor Lant out of palm-leaves, the outside being differently coloured by bark and beaded with small shells, representing various figures. Although these boxes are of a strong make, light and water-tight, yet they have one fault, namely, of not being supplied with lock and key. Placed on each other they are good substitutes for cupboards and chests of drawers, while a strong but roughly made timber chest, provided with a clumsy iron or brass lock, contains the family jewels, consisting of gold and silver ornaments, inherited weapons of different workmanship, and emblems, over a century old.

In a small adjacent room, constructed of attap, we find the kitchen, where the daughter of the house, or perhaps the mistress herself, is seen preparing a frugal meal in earthen or cast-iron pots, placed on a few stones over a fire kindled up by dry sticks, which is kept ablaze by the occasional beating or fanning with a rag of some worn-out piece of clothing, while the smoke, after penetrating through the whole of the house in thick clouds, finds an outlet through an opening in the roofing or the holes which serve as windows.

An assemblage of such huts or houses forms a village, or, as the Malays term it, a "negory" (the number of houses varying from four to fifty). A wall of about six feet in height and $2\frac{1}{2}$ feet in breadth, constructed of hard blocks of coral, surrounds the village, and is intended for a fortification in time of war. All villages, or negories, with exception of a very few on Great Key, are situated on the seashore, which accounts for the expertness of the native in the management of boats, and in swimming and diving.

A certain amount of uncultivated land belongs to each village, the boundaries of which are established by the chiefs. Here the native may fell his timber, cultivate a garden, cut down the sago palm, which furnishes his principal food. The coco-nut trees, however, met with on such ground are regarded as general property, and are under the guardianship of the respective chiefs, without whose orders not a single coco-nut may be plucked until harvest-time, when on a day appointed for that purpose, the whole village will set out and gather them, each member receiving a certain amount of coco-nuts according to his rank and station.

I will now give a few details regarding the habits and character of the people. From infancy accustomed to live in a wretched state of uncleanness—for although the children are seen tumbling about in the sea for hours daily, they do not keep the body clean by daily fresh-water bathing—nearly every native is more or less attacked by skin diseases. The form most common is termed *cascado*, which is contagious, and nearly every person suffers from it more or less. According to the natives, it is caused by eating uncooked sago; but this cannot be the case, as many other natives in the East India Archipelago who are compelled to make sago their principal food, are not subject to the disease.* My idea is, that it is owing to the deficiency of the amount of salt taken into their system, cooking salt being almost unknown in the islands; and that it is aggravated by their not adopting the usage, common to many uncivilised tribes, of lubricating the skin with fat or oil so as to render it soft and pliable. This, together with their habit of allowing the salt-water to dry upon their bodies after a sea-water bath and the impeded perspiration, may account for the shrivelled-up condition of the skin, which exfoliates in small scales. This fearful disease begins generally on the lower parts of the body, showing itself at first, similarly to ringworm, or wildfire rash, in a small red speck with rugged edges, and semicircular in shape. In course of time the speck gradually enlarges, until after a year or two the whole of the body is covered by it, even the head, causing a dreadful sight, as the skin becomes of a whitish colour, as though the man thus attacked had jumped into a barrel of flour. The skin shrivels up, and presents an enormous mass of small scabs, which the afflicted person, on account of the irresistible irritation, is continually scratching off.

This disease, if not checked in its infancy, runs its course of four or five years, in many instances even much longer, to the great torment of the afflicted person; and I may say with correctness, that of the total population of the Key Island not 20 per cent. are free of the

* In the 'Narrative of the *Challenger* Voyage,' vol. i., part 2, p. 553, the disease is stated to be a bad form of vegetable itch, due to a parasitic fungus, closely allied to or identical with *Pityriasis versicolor*, and that it may be easily cured.—[Ed.]

disease, which is propagated from one person to another by contact or by wearing one another's clothing.

Some of our foreign labourers, such as Chinamen and natives from Amboina, were attacked by Beri-Beri and succumbed before they could be removed to their native country. Our Company having to supply its labourers with medical comforts, it can be easily understood that the greatest part of the supply is spent on natives not employed by us, and I was myself generally called on to assist in cases of illness occurring in our immediate neighbourhood, I thus had ample opportunity of studying the various complaints. The first symptoms of Beri-Beri, a disease which causes such great mortality and havoc in some parts of Netherlands India (especially in Atjeh, where even the European soldiers suffer severely from it), are small and almost imperceptible swellings of the feet, which, as in dropsy, are more noticeable at night. There is fever more or less, a dried, parched, and furred tongue, and a gradual disinclination to work.

Small-pox, which is at all times more or less prevalent amongst the natives in the Moluccas, visited the Key Islands during the years 1886-87, causing great distress and havoc amongst the natives of Great Key.

When a native child is strong enough to assist its parents in their daily occupation it has to accompany them to the garden, the boat-building yard, or other place of general work. Children from three to five years of age are seen occupied in trying their skill in carving ornamental figures such as are used for the figure-heads of boats, or in cutting out models of vessels and rigging the same, or the boys will assist their fathers at the building of a boat, or a house. Although deprived of all proper drawing materials, the artistic and constructive talent is almost universally manifested; the children are seen trying their skill by drawing on a smooth surface of fine sand, houses, animals, steam and sailing boats, fishes, &c., and I have been always struck by the symmetry of their work. But although thus displaying great inclination to utilise their mental and manual powers, the laziness inherited from their ancestors as a rule grows up with the children.

The general age at which a child is deemed marriageable is fifteen. Almost immediately after the birth of a female child, arrangements are made by the parents to select a proper suitor, and to fix upon the customary payment of dowry, which becomes the property of the parents of the bride, and consists principally of gongs, lilas, miriams, and other trade articles, varying in value from 600 to 1200 florins. If the parents of the chosen bridegroom do not find themselves in possession of the amount of dowry contracted for at the time of the marriage, their relatives and friends, but in case of a chief the whole district, will contribute to the payment. To the celebration of the wedding feast the whole village and distant relations are invited, each family of the

wedding guests contributing to the same by bringing a hamper with them, containing home-made sago, rice, camiri-nut, and sweet-potato cakes, while bamboos of about two to three feet in length, filled with sagero or arrack (but at a Mahomedan wedding festive trays of fancy cups filled with coffee) are handed round after the guests have partaken of the roasted goat. After the guests' hunger has been quieted in this fashion, dancing, accompanied by music and noisy merriment, sets in and continues throughout the night.

If, after a time, the husband finds that his wife is not to his taste, or does not answer his expectations, he is permitted to divorce her, and the parents of the divorced wife are obliged to return one-third of the paid dowry. This payment of dowry to the parents of a bride (sold in this manner to her husband) makes the birth of a female child a matter of far more rejoicing than that of a male one; and it is easily seen that the parents have more affection for their daughters and give them a more careful education (if I may term it so) than is spent on their sons. Polygamy is permitted, and adultery is carried on to a great extent, although the heaviest fines and punishments are inflicted upon the offender.

Most of the disputes amongst different villages relate to the boundaries of adjacent properties, and in such cases resort is generally had to the customary native way of settling the question, which is as follows:—

Each of the two quarrelling districts elects a person, who is committed to the judgment of their god, who it is believed will let the guilty or wrong party die within a period of three months; so that if, after an elapse of this period, no harm befalls either party, the dispute is settled by dividing the disputed land equally.

The chief talent of the natives is that of boat-building. The symmetrical construction of their vessels, large and small, would astonish a European shipbuilder, and is the more remarkable as they have nothing but the most roughly-shaped tools. Their boats, varying in size from that of an ordinary canoe to a two-masted schooner of about 150–180 tons burden, are partly employed in the Aru Islands, situated to the eastward of Key, where they are used in the pearl-shell fishery. Some go to Banda and the surrounding islands, where they are sold at a very low price.

All requisite tools, such as axe, chisel, clewang, bush-knife, &c., are made by natives of Teor, who have emigrated to Key in order to obtain a living by forging tools, weapons, &c., and selling the same to the inhabitants of the islands in exchange of other trade goods. Nearly in every village we find a smith established, employed from morning till night in melting rusty nails in a charcoal fire, kept burning by means of a very primitive pair of bellows, and set in motion by his helpmate, who is seated on a bamboo bench of a three feet height, exerting himself in pumping a continual stream of cool air into the fire. This apparatus consists of two large-sized bamboo cylinders, of about two feet length,

at the bottom of each of which a small bamboo conveys the current of air into a still smaller one, which leads into the charcoal fire. Each of these bamboo cylinders contains a spear of the same material, at the lower end of which are tied bunches of feathers, and by the steady and continual heaving up and down of these spears alternately, a strong current of air is kept passing into the blacksmith's fire; it is unnecessary to mention that these vertical bamboo cylinders are provided with openings at the bottom to allow the supply of air to pass through the lower box. Generally, a native of Key will prefer the rough workmanship of the tools made by the village blacksmith to the finely finished and polished ones imported from Europe.

The principal occupation of the inhabitants is that of felling and selling timber, which forms also the largest export of the German colony and other traders. Of course the native will fell at first the trees growing in his district close by the sea-shore, entirely regardless of age or size; and as there are no means of convenient transport from the place where the tree is felled to the market, over very uneven ground, he prefers to cut down trees of young growth which will furnish a beam of about 18-20 feet in length and six inches square; such beams being also more suitable to the Macassar traders for convenient stowage on board of their vessels.

For felling the trees the native uses a wedge-shaped axe only, by which he is able to cut down the largest tree, and after having lopped off all its branches and bark, he squares the trunk, and this is executed in such a skilful though wasteful manner, that, as a rule, the four sides represent exactly the same dimensions; on no account will the native be persuaded to smooth off just the top and bottom sides, thus not only giving himself less labour and more profits, but also to the buyer more timber and less waste.

The islands produce large quantities of various kinds of very hard and soft timber, suitable for different branches of building, but the most suitable sort is the so-called *bayam*, or New Guinea teak, termed by the natives in the Malay tongue, *caijeo-bessi*, or iron-wood, on account of its strength, flexibility, and durability, as well as its freedom from attack by white ants.

Mother-of-pearl shell, of the same quality as that from the Aru Islands, is found in the bays and inlets of this group, but the uneven coral formation of the sea-bottom does not permit fishing up this valuable shell by means of diving-bells or dresses, which would be too dangerous here. Some of the heaviest and best specimens obtainable have been found in a few feet of water at time of the lowest ebb, and there remains no doubt of this valuable shell being hidden plentifully in the caves formed by the coral. Other valuable shells are plentiful in the islands, and are exported by our Company as well as by other traders.

The export of copra is very small, and entirely in the hands of

the Macassar traders. Tortoise-shell is exported in very small quantity. Fishing on a large scale, by means of nets, is carried on only by traders from Ceram, who are well acquainted with the curing of fish, and who sell it to the natives in exchange for wearing apparel and other articles of produce.

On the perpendicular face of a cliff on the north-west coast of Nuhuroa, are to be seen rude native drawings of various shapes and meanings, chiselled in the rock, which appear to have been once filled in with red pigment, now partly denuded by exposure to wind and weather. It is a marvel how the chiseller could have been suspended over these very steep rocks, so as to be able to engrave the figures. What their meaning might have been, or the rude artist's idea and reason for executing these strange and horrid-looking caricatures, I cannot imagine. The eye may distinctly perceive such figures as a little sailing boat, a human head, hand, foot, star-fish, tomb-stones, and many other objects, and it is strange that similar figures are still drawn and painted to this day by the natives on various articles in use, such as a boat, drum, weapons, earthenware, &c.

Natives, on being questioned about these rock engravings, answer that they cannot account for them, nor were their fathers before them any wiser, but they think that the spirits of the dead suspend themselves over the cliffs at midnight, and engrave them. All natives shun this spot, and by no means whatever can they be induced to climb the cliff in order to copy these strange drawings. No native can be persuaded to accompany a European to this spot, where, according to his belief, the spirits hold their meetings.

Certain trees also are held sacred, and believed to be the abode of an invisible god, to whom the native offers sacrifice whenever any mishap occurs in his family, such as illness, death, &c., or before one of the members of his family leaves home to go over the sea in his frail vessel. The sacrifices are made in the following manner :—Some cooked sago or rice is wrapped up in a palm leaf, and before tying the same with a piece of split cane in the shape of a parcel, the person thus sacrificing, scrapes over the sago or rice, by means of a knife, file, or any other sharp-edged stone, a little gold-dust off his ornaments, such as a ring, bracelet, chain, &c. After this has been executed he ties the parcel together, and suspends it by means of some split cane, from a branch of this sacred tree, under fervent prayers to his god. In certain parts of the islands, the traveller will find these sacred trees, ornamented from top to bottom, like a German Christmas tree, with these odd-looking palm-leaf parcels.

In other parts of the Key group there are still found public places for sacrificing, consisting of a fanciful carved box, elevated on a pole of about four to five feet in height; a small opening in this box is meant to convey the sacrifice therein.

Some places on the islands are shunned by the natives, who prefer walking a long distance out of their direct way to being obliged to pass the haunted spot, where his imaginary Satan, and bad followers, are supposed to hold their meetings by night or day.

I have already stated that the whole surface of these islands is covered with vegetation. There is, in fact, not the smallest patch of land bare of trees. Gigantic creepers climb up the trunks, and after having attained a certain height, spring from tree to tree, and intertwine the whole in a close network. Here and there are to be seen on the tree trunks grand orchids of different species, some of them bearing magnificent blossoms, and splendidly coloured butterflies chase each other amongst the thick foliage. Birds, too, are numerous, and many of them of lovely plumage.

In the thick mangrove bushes of the bays a species of orocodile is found. He is often seen lying, apparently asleep, with open mouth, or on watch, perched on a fallen tree, unperceived by the passer-by, yet at all times ready for action. Above him in the trees lurks the flying squirrel, enjoying a cool draught from a stolen coco-nut, while a small-sized tree-kangaroo and bear are seen enjoying sport, each in its own peculiar way.

With regard to domestic animals, the natives only rear fowls and goats, though some of the Hindu inhabitants raise pigs, which keep to their respective villages and remain quite tame, enjoying sport with the cats and dogs, so plentiful in the Key Islands.

A Note on the Conservative Action of Glaciers.

By DOUGLAS W. FRESHFIELD, SEC. R.G.S.

To estimate the past performances of the forces that have modelled the surface of our planet by the amount of action of which we find them capable in its present condition would be, no doubt, an elementary blunder scarcely possible to any one in the least acquainted with the progress of geology. Yet we can hardly be wrong in believing that the present action of natural agents will be similar in kind, if not in extent, to that which they have exerted in previous ages of the world's history. If running water failed to excavate rock, if no contemporary river materially deepened a ravine or enlarged a delta, we should, probably, feel compelled to look elsewhere for the origin of ravines and deltas.

A heroic part in the architecture of the earth's surface has been attributed to glaciers by high scientific authorities. Dr. Tyndall has recorded, and repeated in a popular form,* his own conviction that the "paramount influence" in the sculpture of the Alps has been that of ice, though he frankly adds, "whether the conclusion fairly follows from the facts is, I confess, an open question." This confession must be my excuse for venturing to argue in opposition to one so eminent both as a man of science and as a mountaineer. Again, Sir Andrew Ramsay, while refusing altogether

* 'Philosophical Magazine,' 1862 and 1864. 'Hours of Exercise in the Alps,' 1871.

to accept Dr. Tyndall's hypothesis, has repeatedly put forward another hardly less remarkable one of his own with regard to the powers of ice. He summarises, as follows, his own belief*:—"The chief part of the lakes of our country, I do not say all, have been formed under the influence of ice, and not of our country alone, but of a large part of the northern, and I have no doubt also of the southern hemisphere. It is a remarkable thing to consider, if true—and I firmly believe it to be true—that so many of those hollows in which lakes lie have been scooped out by the slow and long continued passage of great sheets of glacier ice."

How far do the facts brought constantly under the eyes of mountaineers bear out the conclusions of these two eminent physicists? The question has been asked and answered over and over again,† by no one better, perhaps, than by Sir Roderick Murchison in the President's address to our Society in 1864. Among geologists the answers already given may be thought more than adequate, and an attempt to add to them may, perhaps, seem superfluous. But the general public, and in particular those engaged in teaching, are, I know by personal experience, still impressed by the authority of great names, and by the persistent enforcement in text-books, both English and American, of views that have never obtained general acceptance among the most competent judges. It seems, therefore, desirable once more to discuss the character of glacier action with the advantage of the recent observations made by surveyors in the New World.

I shall assume that the behaviour of living glaciers is very much to the point in the consideration of the kind of work done by their extinct predecessors. It must be so—unless indeed it is argued that contemporary glaciers are too feeble, have not, that is, the weight and velocity needful to burrow and bore, dig holes or trenches, basins or valleys. Now, for the last twenty-five years I have had constant opportunities of observing glaciers at work in the Alps and elsewhere. The period has been one of rapid retreat of the ice following on one of advance,‡ and it has therefore been peculiarly favourable for determining the action of the lower portion, or snout, of a great glacier.

Let us look at the former beds of some of the swiftest and thickest glaciers of the Alps—the Brenva, the Bossons, the Lower Grindelwald. What have they left behind them in the valleys they occupied thirty years ago? Not hollows, but hummocks. Examine the glaciers of Shkara and Adish in Svanetia. The former has in recent times retreated quite a mile. The extreme terminal moraine has been washed away, but four or five huge blocks, lying in a curve, mark its former position, and behind them the old bed of the ice is an uneven wilderness of rubbish heaps and shallow pools formed by the damming-up of springs. There is, in fact, an exact reproduction on a small scale of the features found over vast areas within the lines of the great moraines of the Eastern States of North America.§ But I need hardly

* 'Physical Geology and Geography of Great Britain,' 1878, p. 616. See p. 454 for further references to the literature on one side of the subject.

† See 'Geo. Proc.,' vol. viii. old series; 'Phil. Mag.,' 1863, article by J. Ball, F.R.S.; 'Geological Journal,' 1871, 1873, 1874, and 'Geol. Magazine,' 1876 and 1887, articles by Prof. Bonney, F.R.S., Mr. Marr, and Prof. Spencer; 'Scrambles in the Alps,' 1871, by E. Whymper; 'Arrows of the Chase,' vol. i., by J. Ruskin; two instructive papers by Rev. A. Irving in the 'Geological Journal' for 1883; Address by W. Mathews, 'Proceedings of the Birmingham Philosophical Society,' vol. iv. part 1. Mr. E. Whymper gives references which will enable readers to follow up the controversy.

‡ See the very careful discussions in 'Scrambles in the Alps.'

§ This period of general retreat has terminated in the Alps. During the last five years the glaciers with short steep courses, such as the Bossons and the Upper Grindelwald,

multiply Alpine examples, which so many readers can supply for themselves. Burnishing I have found glaciers often, scraping or pushing back soft protuberances in their path sometimes, but scooping or excavating, never. Nor, I fancy, have my friends Professor Bonney, Mr. John Ball, Mr. E. Whymper, Mr. W. Mathews, or Mr. Nichols, been more fortunate.

Similar testimony comes to us from distant quarters of the globe. I quoted recently at one of the Society's meetings (vol. ix. p. 283) a remarkable description of an Alaskan glacier, showing how the ice had moved over without disturbing a soft bed.* To the 'Geological Magazine' for 1887 Mr. Marr and Professor Spencer contribute articles on the glaciers of Greenland and Norway, the general result of which is adverse to the supposed powers of glaciers as destructive agents.†

If we glance for a moment—and space allows no more—at the work of Transatlantic Surveyors, we shall find in Reports, which are models of clearness, and are illustrated and mapped in a manner which enables readers to appreciate for themselves many of the facts as well as of the arguments set out by their authors,‡ a mass of evidence which places it to my mind beyond doubt that the huge ice-sheets of the second glacial epoch, equally with those of our own time, advanced over soft gravelly bottoms without disturbing the surface, and were ready when needful to

have begun to advance in a very notable manner. The Norwegian glaciers are advancing. Count H. Russell informs me that the Pyrenean névés are rising, so that the caves he had excavated near the summit of the Vignemale risk being buried shortly. The Adish glacier in Suanetia is also advancing, and so are others in the Caucasus. It would seem certain that the movements of the ice are more or less sympathetic throughout the Old World. (See M. Förel's articles in the 'Jahrbücher' of the Swiss Alpine Club.)

* As soon as arrangements are made—and there can be little doubt that American enterprise will shortly make them—for steamers to call during the summer occasionally at Yakutat, two days' steam beyond Sitka, the Pacific flanks of the mountain ranges on the frontiers of Alaska and British North America will be the most accessible spot on the globe for the study of glacial phenomena on the largest scale. Mr. Seton Karr writes ('Alpine Journal,' No. 102, p. 167), "The world offers no similar field for the study of Brobdingnagian glacial phenomena. The whole glacial system forms a province of ice measuring hundreds of miles in length and thousands of square miles in extent . . . and this in a latitude lower than that of the Shetland Islands."

† I must guard myself, however, against being supposed to accept entirely the statements and conclusions of these writers. Prof. Spencer, in particular, seems to me to have confined his attention almost entirely to the snouts of glaciers, and to go much too far in depreciating the powers of the ice.

‡ These American illustrations are in striking contrast to the obsolete old woodcuts and inaccurate caricatures which are still passed off on the English student as representations of mountain phenomena in text-books written by the best authors, and issued by the first publishers. *Corruptio optimi pessima*: and I cite therefore, without respect of persons: Huxley's 'Physiography' (Macmillan & Co., 1885), plate 39, where a moraine is represented by stone-heaps discharged at regular intervals, as if from a road contractor's cart; Geikie's 'Text-book of Geology' (Macmillan & Co., 1885), plates 140, 142; Helmholtz's 'Popular Scientific Lectures' (Longmans & Co., 1873), plates 13, 16, 20; and Miss A. Buckley's 'Fairyland of Science' (Stanford, 1881), plate 29. Some of the cuts referred to are derived from the works of the early Swiss glacier explorers, circa 1849! The progress of photography and photographic processes has now made bad illustrations inexcusable, even in the cheapest publications; and for those who can afford first-class wood engraving, Mr. E. Whymper long ago showed how accurately and artistically mountain features may be reproduced.

accumulate behind and overflow solid obstacles rather than to level their road by their removal.*

I must find space for one or two typical quotations from the Pennsylvania Report :—"The occurrence of lakes is one of the most characteristic features of the glaciated area of the United States. A hundred thousand exist back of the terminal moraine and almost none in front of it. They were at first ascribed to the eroding force of the ice, under the supposition that they were scooped out in the solid rock, but facts suffice to indicate that their origin is due to filling up rather than to scooping out—to obstruction rather than to removal."—p. 29.

"That the erosive power of the glacier was slight along its northern edge is shown in the uniform character of the topography, both of mountains and valleys, in the glaciated and non-glaciated regions. The straight narrow edge of the Kittatinny Mountain extends from the Delaware to the Lehigh with no apparent difference in appearance or in elevation, while the Delaware Gap and the Lehigh Gap are closely similar in shape. Yet the glacier crossed the mountain and gap with scarcely an appreciable effect upon their topography.

"There is no proof that the glacier scraped off as much as 100 feet from the top of the mountain. Cliffs 70 feet high in front of the moraine upon the Kittatinny Mountain may serve as a measure of the amount of erosion. Evidence both of the thickness of the glacier and its great impetus, however given, is afforded by the fact that it flowed upwards and across the sharp ridge of the Kittatinny Mountain, although close to its extreme southern terminus."—pp. 90-1.

Again we may turn curiously to Dr. Von Haast,†, a hostile witness, cited by Sir Andrew Ramsay, with legitimate satisfaction, as a convert to his views. How strangely inconsistent with such a conversion do many of Von Haast's own observations appear! We read of lakes surrounded by moraine accumulations, of huge glaciers moving forwards without disturbance to their beds. A valley on the west coast of New Zealand is described, "where the glaciers advanced over a deposit of such apparently incoherent nature as a gravel bed without destroying it to any appreciable extent." At another spot, "the peculiar conditions of an assembly of beds go far to prove that glaciers, when advancing again after their retreat, do not always clear out their former channels of moraine deposits accumulated therein; and that even under favourable circumstances the finest gravel will, when protected by moraines of comparatively inconsiderable thickness, be so thoroughly protected that no change in its stratification can take place." And again, "Lake K, like nearly every other lake on both slopes of the Southern Alps, is surrounded at its lower end by a broad circumvallation of moraines." This general statement is fully borne out by the geological map appended to Dr. von Haast's volume.‡

* See, *inter alia*, Reports of United States Geological Surveys for 1881-2 and 1883-4 Preliminary Report on the terminal moraine of the second glacial epoch, by J. C. Chamberlin, and 'Existing Glaciers of the United States,' by C. Russell. [The lake shown (plate lii.) in this report is referred to by Mr. Eccles ('Alp. Journal,' vol. ix.), who was of the party, as formed by glacial excavation. The plate suggests rather that it may be the result of moraine rings.] Geological Survey of Pennsylvania, Report 2; Terminal Moraines, 1884. See also the Reports dealing with Alaska.

† See 'Geology of Canterbury and Westland,' pp. 385, 390-1, 396 and 223.

‡ Valuable facts may be found in two articles, Dr. Albert Penck's "Das Land Berchtesgaden," and Dr. A. Geisbach's "Die Südbairischen und Nordtirolischen Seen," 'Zeitschrift des Deutschen und Östn. Alpenvereins,' vol. xvi., Salzburg, 1885: acts the more valuable because both writers are themselves inclined to believe in a glacial origin for at least some of the lakes described.

The behaviour of the lower extremities of glaciers is not, however, conclusive evidence against the formation of lake-basins by ice. It has been argued that glacier-snouts never could excavate; that it is where the ice is both thickest and swiftest, below the base of some upper icefall, that we should look for traces of such action. It is true this is not the line taken by the champion of the erosion of lakebeds by ice. Sir Andrew Ramsay rests mainly on weight, and believes that sluggish thick ice will exert most erosive power. But a scientific ally has differed from him on this point. Dr. Tyndall says, in effect,—“It is quite wrong to suppose that it is the snout of the glacier that ploughs; where the weight, and consequently (other things being equal) the motion is greatest the scooping power will be greatest. I say nothing about lake-basins: but it is a physical certainty that, given time enough, glaciers must scoop out valleys. A glacier with a thickness of 1000 feet will press on every square yard of its bed with a weight of 486,000 pounds. Such weight with a motion derived from a pressure from behind *must* excavate.”*

I cannot speak with any personal authority on questions of physics. But while it is, I believe, certain that an increase of thickness, and consequently increased weight, will (other things being equal) increase the velocity of the upper surface of a glacier, it is not so obvious that increased weight will increase the velocity of the lower surface, which, owing to the tendency of the layers of ice to slide over one another, or shear, and to retardation consequent on friction, is generally only a small fraction of the velocity of the upper surface. But it is nevertheless true that increased thickness and weight will be accompanied by a proportionate increase of erosive power, and we may feel, I think, confidence that we are carrying on our investigation fairly if we look for the most conspicuous results in places where not only must the mass of the ice have been greatest, but also its lower surface swiftest—in short, in the sort of places in which we should expect to find running water most efficient as an excavator.

Now it is quite clear that the lake-basin generally selected as an example of glacial excavation by the advocates of this theory, Geneva, is not in such a position. The ice covering it must have been more sluggish and (owing to the well-proved tendency of glaciers to spread out fanwise when they have space to do so) less deep while it was excavating—I accept for the moment the glacial hypothesis—than in the gorge of St. Maurice, where no lake has been created. It would seem, therefore, that the bed of the Lake of Geneva can hardly have been excavated by glacier ice.

The conclusion that ice does not scoop out basins may be supported by other weighty arguments. Where on the sides of a glacier the ice has impinged against a rock surface it leaves convex, not concave, surfaces. That is, it spends its force on rubbing down projections, and does not scoop out hollows. Why should the under surface act differently? Again, some Alpine lake-basins—Lago di Lugano, for instance—do not lie in the natural tracks of glaciers. Mountain tarns are distributed not according to glacial extension but to geological formation. In the Alps they are found in far the greatest numbers among the crystalline rocks of the Maritime Alps, Canton Ticino, and the Adamello group. Again, if the presence of lake-basins involve the former existence of glaciers, the former existence of glaciers ought surely to involve the presence of lake-basins. The absence of lake-basins in ranges once extensively glaciated must be, at least, a serious objection—hardly to be met by the hypothesis that they have been, without exception, silted up—to the theory of their origin we are discussing.

My present business is not to supply a theory of the origin of lake basins, but only to assist in refuting the hypothesis which regards the majority of them as

* ‘Hours of Exercise in the Alps,’ pp. 238, 247.

created by glacial erosion. Such basins are, I believe, the result of many and very various causes. There were great lakes in Switzerland before the Glacial period.* Basins are common to all kinds of formations.† Many are submarine. Some lie in geological faults.‡ Others, including possibly Geneva, may result from the subsidence of the upper portion, or the elevation of the lower portion, of an ancient valley causing a part of it to be subject to perennial inundation. It would be wonderful indeed if the undulations in the earth's surface had been so ordered that there were no hollows or basins without natural vents, if lake-beds, or the greater part of them, had required to be scooped out by a special tool. Many, no doubt, though not scooped out, have been endyked by glaciers. In the simplest form this is effected by the ice moving across a valley and obstructing the stream, as at Mattmark and in the Allée Blanche. Or a retreating glacier may leave behind it a moraine compact enough to hold in a river or to dam local springs, as in some of the lakes of New Zealand (described by Von Haast) and those of North America.

There is another way, to which attention was called years ago by Dr. Falconer,§ in which ice may assist in creating lake-basins. The tendency of a glacier when its course is nearly level is to raise rather than excavate its bed; but where a great trunk glacier occupies a valley or depression, it will raise the ground under it less quickly than it would, if not under ice protection, be raised by the alluvial deposits and earth-slips derived from the impending slopes. The hollow the glacier finds it will keep comparatively empty. The moraines will serve as dykes to divert the alluvial deposits of lateral torrents. The ice itself will act as a gigantic sledge, and carry down the rock-falls to build a terminal moraine. The basin or bed of the glacier, when uncovered, will differ from an unprotected valley, in being more uniform and U-shaped, without fan-like alluvial slopes or banks of talus.

Let us recapitulate. It is clear that neither the glaciers of the present day nor those of the last glacial epoch can or could on the level delve *with their snouts* even into an "incoherent shingle bed." If they scooped anywhere, it must have been where the body of the ice attained its greatest weight and velocity. Most of the great lake-basins, however, are found under the snouts of the ancient glaciers, where the ice had neither its greatest weight nor its greatest velocity. There are, on the other hand, few important lake-beds under steep slopes, where we might expect to find them. Some lakes are in positions which appear to exclude a glacial origin for their beds. Many glaciated chains have few or no lakes. Lakes and tarns are in many parts of the world distributed quite irrespectively of ancient glacial extension. There are no subalpine lakes in the South-western Alps, the Caucasus, or the Pyrenees.

With regard to any general connection between glaciers and the excavation of lake-basins I have become profoundly incredulous. But it is always well not to allow oneself to be drawn too far in the opposite direction by the enthusiasm of investigators eager to simplify the complex processes of nature in favour of some one they may have for the moment taken under their special patronage. It appears physically possible, and even probable, that glaciers—(particularly glaciers the velocity of which at all approaches the measurements said to have been obtained of the motion of the Jakobshavn Glacier in Greenland, 49 to 73 feet, or of another glacier on the western coast 99 feet || per diem on the surface)—might, where the angle of their bed changed

* Ramsay's 'Physical Geology and Geography of Great Britain,' p. 268.

† Ibid., p. 298.

‡ See Reports of the Geological Survey of the U.S. for 1882-3.

§ 'Proc. R.G.S.,' o.s., vol. viii.

|| Heim, 'Handbuch der Gletscherkunde,' p. 145, 'Nature,' vol. xxvii. p. 200. Dr. Rink, "Das Binneneis Grönlands," 'Zt. der Gesellschaft f. Erdkunde zu Berlin,' No. 137,

from a steep slope to a level, exert a very perceptible scooping or burrowing force at the angle. I do not remember having noticed any instance of such action among contemporary glaciers, but I should not be at all surprised to come upon one clearing out, or even scooping, something like a basin in such a situation.

Having ventured so far, I can hardly avoid expressing an opinion on the separate, but not quite so simple, question of the action of glacier ice in valley excavation. In science, as Sir Andrew Ramsay complains, as much as in politics, and with less excuse, misrepresentation of an opponent's standpoint frequently takes the place of argument. Let me say at once, therefore, that I am not so blind as to deny the power of the ice-stream, armed with its "gravers," the rocks and grit it holds in its grasp, to grind, smooth, scrape, scratch, and polish within certain limits any protuberances it may encounter. Given eternity, I would admit even that it might excavate valleys; that is if it could find any ranges the exposed portions of which would not sink from sub-aerial denudation faster than the "gravers" bored. But geologists work in time—though they sometimes make free with it!

I believe that a careful inspection of mountain valleys shows conclusively the very limited extent of ice action as a quarrier or excavator. And I would urge all who consider water, as compared with ice, "the weaker agent," to measure their respective performances at Grindelwald and Rosenlani, where between the superficially ice-abraded rocks the torrent has carved for itself a bed hundreds of feet deep.

It would be tedious to recapitulate in detail arguments often urged elsewhere to show that Alpine valleys do not owe their origin or their general outlines to glaciers. And it is the less needful, as here we have our late adversary with us. What can be more explicit than Sir Andrew Ramsay's statement on this point? * "The great original valleys of the Welsh mountains were by no means scooped out, but merely modified by the glaciers." And again, "One great fact which the striations teach is this, that the broad and thick ice-sheet urged onward from the north, buried the whole of the region described; and further that the glacier, *moulding itself to the slope of the country* † (after the manner of all glaciers), was pressed right onward with so much force that the long northern slopes of the east and west valleys offered, comparatively, no more impediment to its onward march than an occasional transverse bar of rock hinders the onward flow of a river." ‡

To these far-reaching admissions I should like to add on my own account one argument or suggestion. Surely, if the Alpine valleys had been eroded by ice, those which must from a very early stage in valley formation have carried off the drainage of the largest snowy basins, those, that is, which have for ages contained the most powerful glaciers, should be the deepest. Take a familiar region: the Bernese Oberland. We find that the contrary is the case. The Aletsch Glacier lies in a trough

gives 50 feet in 24 hours as the average motion of the central surface of the great Greenland glaciers. The highest velocity recorded in the Alps is 32 feet a day. This was reached by the Vernagt Glacier in the Eitzthaler Ferner for a few days only in 1845.

* 'Physical Geology and Geography of Great Britain,' 5th edition, 1878.

† The italics are in the original.

‡ It is true we read elsewhere (p. 384), "the whole of the regions mentioned have literally been moulded by ice" where the rôles of the ice and the land seem inverted. It is presumptuous, perhaps, in me to offer an explanation of the apparent contradiction, but I believe the difficulty lies in the use of an identical word, *moulded*, with different significations. In the first passage Sir Andrew Ramsay may refer to large outlines, in the second to small details. He may mean that the contour of the land is impressed on the ice, but the surface details of the land are modified by the ice. The contradiction apparently involved in the supposition that this mouldable substance 'originated by scooping most of the lake scenery of our country,' p. 353, I cannot pretend to explain.

higher than that of the Viesch Glacier; the Grindelwald Valley is shallow compared to that of Lauterbrunnen. Or take mountain groups. Why, if ice made the valleys, did the Tödi ice and the Bernina ice act so disproportionately? Why was the Ober Engadin left as so insignificant a depression? And one can hardly refrain from repeating to the supporters of either form of glacial erosion the often asked question: How can you expect it to be believed that a tool which made the enormous excavations of the Lake of Geneva, or of the valley of the Rhone, broke down before such an impediment as the crags of Sion? Are you honestly satisfied with the answer that they owe their survival to exceptional toughness? Have you any adequate proof of such toughness, at Sion, or at Arco, or at Bellinzona?

I have read with attention the summary* of the arguments recently (1883) used by speakers who ought to have been able to do justice to the case for glacial excavation. I can find nothing to shake for a moment my conclusion—little even calling for answer. Colonel Godwin-Austen states that Himalayan glaciers push before them soil. No wise person would dispute it: so did the Gorner Glacier; if the glacier had not the power of moving loose obstructions it could not even push forward its own moraine. Unless the Himalayan glaciers excavate solid rock or scoop out basins in flat soil, the facts stated are outside my argument. Mr. Blanford calls attention to what he conceives the *a priori* argument from the supposed fact “that lakes abound where ice has been, and are wanting or rare where ice has not been.” I retort, with Sir Charles Lyell, “The Caucasus has no lakes.” I traverse the general statement, and I allege that in so far as it has any foundation, other causes than glacial excavation exist to account for the basins. Professor Seeley urges a common and specious objection—founded to a certain extent, perhaps, on the indiscretions of my allies—that it is obvious that glaciers exercise erosive action, and that time, therefore, is all that is needed to have enabled them to do all the work that they have been credited with. I reply that the actions of rubbing down solid rock or pushing forward loose material, and of excavating or scooping have little in common, that it is traces of the former that we observe in the past and the present, and that to allege such traces as evidence of the latter, to confound abrasion and erosion, is illogical and illegitimate.

The conclusions I am drawn towards are of a very different nature from those lately popular in this country. I will endeavour to state them shortly and simply. The glacier I should say—adopting a terse expression from Professor Heim—is more of a sledge than a spade, the rocks that it carries with it are mainly the result of weathering on the heights that surround it.† “Scientists” have found rubbish under the ice, and they have assumed hastily that it was all excavated. But every observant mountaineer who has spent days among the glaciers knows well that a constant transference of rocks and soil is being effected from the surface to the bottom. The glacier is never silent in summer; the rattle of the stones falling down crevasses, the murmur of the streams plunging into *moulins* is continual, and the matter thus transferred must go to form ground moraines. Such moraines will only be found, however, on level ground; where the glacier falls steeply it will sweep its bed clear of loose material.‡

* ‘Geological Journal,’ vol. xxxix. p. 71.

† Glaciers whose channels are little overhung by rocky slopes have comparatively small moraines. Having fewer tools in their grip in the form of fallen blocks, they will naturally grind less also. The Gul Glacier under Ushba is a capital example of a small glacier with enormous moraines, derived from the height and rottenness of the crags that encircle its basin.

‡ I may refer here in passing to a point of detail on which Sir A. Ramsay calls for

Nature does not seem to me to bear out the theory that U-shaped or broad bottomed valleys have been enlarged by glaciers. On the contrary, so far as I can see, U-shaped valleys are not V-shaped—or trenchlike—valleys broadened by ice, but V-shaped valleys are U-shaped valleys deepened by water action. I recognise that snow and ice, by protecting much of the soil from weathering, by carrying on their surface a portion of the drainage, and frequently distributing the remainder so as to diminish its erosive force, by dropping, as they withdraw, the rubbish they have brought with them, tend to protect from erosion, and even to fill up the sides and troughs of mountain valleys. Such valleys I find are apt at once to assume a V-shape and to become suddenly deeper below the principal remains of terminal moraines, that is, where the ground has been less continuously under ice protection. From this I conclude that glaciation is relatively a check to valley formation, that glaciers are among nature's conservative forces.

One more general observation before I pass on. Among the most remarkable "sights" of the Alps are narrow gorges such as the Via Mala, and those found near Trient and Pfeffers. Mere cracks they appear at first sight, and cracks accordingly they were called by observers whose hastiness Professor Tyndall has rightly rebuked. Now we may notice that it is troughs of this nature, very deep and very narrow, that the sub-glacial torrents of the Grindelwald and Rosenlauri Glaciers have cut for themselves. The greatest gorge in the world of this character is the cañon of the Rio Colorado. The rainless climate of Colorado, which saves the sides of the cañon from sub-aerial denudation, is assigned as a reason for its intact precipices. In the Alps, I believe, the superincumbent ice-sheet has produced the same result—it once protected the sides of sub-glacial gorges from rapid changes of temperature and the various agencies of waste. We find that where a barrier presents itself to a glacier furnished with a strong sub-glacial torrent, the tendency of the ice is to pass over the barrier, the tendency of the water to cut through it. The one acts as sand-paper, the other as a saw.

Had the foregoing suggestions been only the *obiter dicta* of a mere climber, I might have hesitated to put them on record. It is not for any novelty in them that I claim attention. Much of what is advanced here has been advanced before and in greater detail by Mr. J. Ball, Mr. E. Whymper, Professors Bonney and Heim, Mr. W. Mathews, and others. But so long as the authority of one or two eminent and popular names lies on the other side of the questions discussed, so long as the evidence and the authorities on one side—and on one side only—are frequently put forward in this country, it seems to me the duty of an independent witness to testify to the facts bearing upon the case within his personal knowledge. My evidence has at least this value, that it is independent. I was brought up to believe implicitly in the destructive action of glaciers, and I have discarded that belief entirely from observations in the field. But perhaps I shall be told, as others have been, that I am only a climber, and recommended to confine myself to topography! I must forestall any objection of this kind by citing a case in point which exemplifies the disadvantages of allowing the discussion of physical questions to be kept solely in the hands of professed physicists.

further information. I doubt both the accuracy of Dr. Tyndall's suggestion in 'Forms of Water' that the slender streams issuing in winter from the Alpine glaciers are derived from the gradual drainage of fissures charged during the previous summer, and the belief of other writers that the temperature under the glacier never sinks below freezing point. Springs rise below the ice from the ground, and some of these doubtless, as do many in the open air, remain unfrozen. The water from the lower Grindelwald Glacier in January last was perfectly clear, and could be leapt dryshod.

More than a hundred years ago, A.D. 1772, a citizen of Geneva, Bordier by name, went on a tramp to the glaciers of Mont Blanc, and on his return published a little 'Voyage Pittoresque,' in which he introduced two chapters on a 'Hypothesis of the Phenomena of Glaciers reduced to a single principle.' This principle of Bordier's none of the philosophers of his own day had the insight to appreciate or follow up. It was not till seventy years later that the scientific men made it out afresh for themselves, and then, with the exception of M. Rendu, they discussed with much energy which of them the idea originally belonged to, unconscious apparently (till Professor B. Studer of Bern * let out the fact) that priority of publication had been secured in the previous century.

Well might Professor Studer exclaim, "It is astonishing how, under the authority of De Saussure, the views of one of his fellow-citizens" (Bordier was a man of some position, a member of the Council of Two Hundred), "which have subsequently been accepted as the more correct, were so completely suppressed and forgotten that in the battle of recent years over the latest development of Bordier's theory, which treats glaciers as plastic (*zähflüssige*) masses, his name has not been so much as mentioned."

But so far, at least, as the most important of the preceding suggestions, the limited competency of ice as an excavator is concerned, I have no claim to the perilous originality of Bordier. My conclusion is in agreement, not only with the English

* In 1863 Prof. B. Studer ('*Physische Topographie der Schweiz*') reprinted the crucial sentence in Bordier's 'Hypothesis.' At Christmas 1871, the centenary almost of Bordier's visit to Chamonix, Prof. Tyndall quoted it at the British Institution, and subsequently printed it in English in 'Forms of Water.' Two passages are there quoted from the 'Hypothesis,' in which the Genevese writer argues that glacier ice is plastic like soft wax, and that the glacier moves forward as a single piece, so that the snows on the top of Mont Blanc will one day reach the valley. Bordier went even further: he observed the opening and closing of crevasses, and "their direction towards the lower end of the glacier exactly as the waves of a stream run with the current;" he argued that in addition to obvious causes, such as, amongst others, expansion and contraction caused by changes of temperature, the crevasses and undulations owed their origin mainly to motion and pressure from above, "which makes the ice crack and the blocks at the edge fall off, just as, when a shock is given to the first of a row of elastic balls, the one at the further end will break away" (he failed, it may be noticed, to distinguish between strain and pressure). He finally suggested that the Chamonix glaciers should be regularly observed, and that stakes should be stuck in the Glacier des Bossons, which he went on to remark was too little visited, because the Chamonix guides were such creatures of habit that every tourist had to follow exactly Pococke and Wyndham to the Mer de Glace, and even in drinking on a certain rock, whatever his nationality, the health of the "Roi George." The writer of a 'Voyage Pittoresque' was naturally beneath the notice of a serious philosopher, or even of a philosopher's follower, such as old Bourrit (beloved, nevertheless, by right-minded men in that he shows himself in all his writings what Goethe called him, a "passionirte Kletterer"), who in the same breath dismissed the other "B" (Bordier) as an ignoramus, and solemnly put forward on his own account the suggestion that glacial undulations were caused by the prevailing winds, an opinion (as Herodotus remarks of a similar hypothesis regarding the floods of the Nile held by certain Greek writers) "not worth naming, except to give the reader intelligence how ridiculous it is." In the '*Alp. Journal*,' vol. ix. p. 327, the more important passages in the '*Voyage Pittoresque (sic)* aux Glaciers de Savoie par Mr. B.: Genève, Chez L. A. Caille, 1773,' are reprinted. Note the anticipation of subsequent popular authors in the description of the circular journey of the snowflake from the top of Mont Blanc to the sea and back again, through the ocean and the air, to its starting point.

authorities I have cited, but also with the verdict, "Glaciation is equivalent to relative cessation of valley formation," arrived at by Prof. Heim as the result of a careful examination of glacier research in the minute and comprehensive work he has lately published on the subject.* The volume abounds in curious experiments and observations, for a full account of which the student must turn to the original. Here I can only mention that the milky colour of glacier-streams is shown to arise from the *fine division* of the particles held in suspension, and not from their quantity. The solid matter brought down by a glacier-stream in the year has been found by experiment to be far less than that brought down by a stream draining an area of similar extent not glaciated.

Two circumstances have contributed to the temporary exaggeration of the destructive capacities of ice as an agent of denudation. In the revulsion from the old doctrine of "Catastrophes" in geology there has been a tendency to dwell too exclusively on the last stage in the earth's history, and to magnify the part of erosion at the expense of preceding agencies. Again, the ice-tool was a very fascinating novelty. Agassiz's observations explained a great many conspicuous and hitherto mysterious details of the earth's surface, the details which, to such petty observers as mankind, give landscape much of its expression and interest. The human mind is prone to assign to the last or most conspicuous agent in all work more than a due share of the credit. Yet none of the tourists who wear with their feet or chip with their hammers the corners of great rock-temples adds a "fecit" after his name: that crowning audacity has been left for the friends of glaciers. For among the mountains ice has, we find, played the part not of a Pharaoh but of a tourist. It has rubbed and scratched. Here and there, it is true, it has shown the more respectable energies of a landscape-gardener. It has carried off loose fragments to build banks and mounds and endyke artificial waters, or has spread fertilising silt over an ungrateful soil.

But comparisons are imperfect, if not odious. I owe an apology to the glaciers for the foregoing, which fail altogether to do justice to their conservative action in protecting what they cover from weathering and diminishing erosion. Before long, I believe, this character of their action will be generally recognised. The notable power of ice to model the finer curves which make scenery will be appreciated. But it will not be thought necessary, in the face of evidence which cannot be reconciled with any such hypothesis, to impute to the same agent the original blocking-out of the mountain forms. The physicists of the future will, I feel confident, point out the impossibility of glaciers acting capriciously under identical conditions, and will insist on the incongruity of arguing that an ice-stream which did not widen the gorge of St. Maurice, on emerging from the mountains excavated the bed of the Lake of Geneva, or that a natural agent which was baffled by the crags of Sion and deflected by the ridge of the Forclaz, could have cut the Valley of the Rhone—out of what appears to be conceived as a uniform mass of uplifted ground rising throughout to a level superior to that of the present ridges by the amount these have lost by weathering since the glacial period.†

* 'Handbuch der Gletscherkunde,' Stuttgart, 1885. Analysed in detail by Mr. F. F. Tuckett in the 'Alp. Journal,' vol. xii. I may venture to express a hope that any of my readers who feel interested in this discussion and tempted to join in it, will, before doing so, read Professor Heim's volume, or at least Mr. Tuckett's careful and clear summary of its contents.

† See 'Phil. Transactions,' 1862, p. 172. I have found in Mr. Ruskin's 'Arrows of the Chase' several letters in which he has forestalled and expressed with his habitual force and eloquence some of the arguments made use of above.

GEOGRAPHICAL NOTES.

The Disaster in the Caucasus.*—Additional information has been received from the Caucasus which, though far from giving any absolute certainty, agrees in pointing to a particular place and manner in which Mr. Donkin and Mr. Fox with their guides may have probably lost their lives. The map published in the 'Proceedings' last June will explain the relations of the localities here referred to. A woodcut of the Ullu-azul Glacier—contained in the 'Alpine Journal' (No. 101)—shows the supposed scene of the accident. The first evidence is that of Mons. N. Djukoff, of the Russian Survey. Mr. Donkin informed M. Djukoff that their plans were to attempt the ascent of Dychtau (16,925 feet), to cross the glaciers to Karaoul, and then to cross to Gebi, south of the chain, by the well-known Pasi-Mta Pass. The next important witness is the Bezingi villager who accompanied the travellers with a baggage horse to their camp in the Doumala Valley. He describes with great apparent clearness how they started on the morning of the 26th August up the glacier of Ullu-azul, which fills the head of that valley. On the morning of the 28th, about 10 a.m., they returned (he noticed) in very high spirits. The circumstances—the two nights spent at a higher bivouac, the hour of return, the high spirits of the party, taken in conjunction with Donkin's communication to M. Djukoff—point irresistibly to the conclusion that the party had attacked Dychtau (N.B. the Dychtau of maps is the Koshtantau of local usage) and had succeeded. On the 29th the party rested in camp. At 3 a.m., on the 30th, before it was light, they started again up the glacier. The native went back to the interpreter with a note dated August 28th, and written in German by Mr. Fox (of which, owing to an obscurity of expression, we at first misread the opening sentence) to this effect:—"We are gone over the mountains to Karaoul. Meet us there." The only discrepancy so far is that the note fixes their fresh start for the 29th. The villager is quite clear in his recollection, and it seems probable, therefore, that after writing it the travellers determined to rest another day. The pass they intended to cross is well shown in the photographs taken by M. de Déchy while I was with him last year. It is obviously not difficult on the Doumala side, and does not *look* dangerous. Mr. Phillipps-Wolley was given to understand that it is used occasionally by native hunters, who, as the fact of an old cairn having been discovered on the Shkara Pass proves, venture far among the glaciers in pursuit of their game.

It only remains to state the result of the search. Nothing whatever was seen or heard of the travellers on the Karaoul side of the mountains. On the Doumala side, prints of nailed boots were found in the moraine beside the lower ice-fall. Fresh snow had obliterated the tracks on the ice. But on the further side of the glacier (at about 12,000 feet), where

* Note by Mr. Freshfield.

the route to the pass leads near to the base of a great spur of Dychtau, the blue blocks of a large ice-avalanche were lying. Some of the search-party reached the spot, but no traces of the travellers were visible on the surface, and deep fresh snow prevented any thorough search. The place indicated is one where avalanches can fall but very rarely. None, I can bear witness, had fallen there last year up to the middle of August. Possibly none had fallen there for years—since the last period of glacial advance—for the source of the downfall was obviously a small glacier clinging to the cliffs above. There was naturally nothing to show the exact date of the avalanche, and it *may* have fallen subsequently to the 30th August. But if, as there seems much reason to believe, these ice-blocks cover the mountain explorers, they were overtaken by a misfortune as little to be anticipated as the earthfall which recently crushed a railway train in Southern Italy. Such stray avalanches occur from time to time in the Alps, but I know of no occasion, except perhaps that described by Mr. F. F. Tuckett, in which his party had “a race for life” at the base of the Eiger, in which mountaineers have been caught, or had a narrow escape, in a position so little apparently exposed to danger as that in which this avalanche fell.

I have also to acknowledge the receipt from Baron Ungern-Sternberg of an interesting account of the visit of Mr. Donkin and Mr. Fox to Urusbieh, where they spent several days in his company, together with copies of their observations on the summit of Dongusorun (14,600 feet), communicated to him by Mr. Donkin. The travellers' effects, which we hope may supply further details, have not yet reached England. It would be ungrateful to conclude this sad record without an expression of sincere gratitude for the sympathy in our countrymen's fate shown throughout the Caucasus by Russians of all ranks, from the Czar himself down to Cossack serjeants. And in particular thanks are due for the helpfulness and exertions of the officers, amongst others Colonel Viruboff, the Commandant of the Naltshik District, and M. N. Djukoff, of the Survey Department, whose position enabled them to facilitate, or co-operate in, the search to which winter has for the present put an end. To Mr. Phillipps-Wolley, who gave up his own plans in order to do all that was in his power to ascertain the fate of his countrymen, it is difficult for their friends adequately to express their obligation.

Dr. Nansen's Journey across Greenland.—The adventurous young Norwegian, Dr. Frithiof Nansen, has succeeded in the difficult feat of exploration he undertook,* of crossing the icy plateau of Greenland from east to west. Letters recently received at Copenhagen from him and his companion, Mr. Sverdrup,† announce their arrival safe and well at Godthaab on the 3rd of October. The party, as recorded in the September

* *Vide* ‘Proc. R.G.S.,’ *ante*, p. 240.

† Translations of these letters with some elucidatory remarks were kindly communicated to the Society by Mr. Walter R. Hearn, our Vice-Consul at Christiania.

No. of the 'Proceedings,'* were disembarked by the sealer *Jason* and left in their boat to find their way ashore through the ice, on the 17th of July last, in lat. $65^{\circ} 2'$, but we now learn that the boat did not reach the land the next day, as the captain of the *Jason* supposed, but was caught in the southerly drift, and, in spite of heroic efforts, carried as far as Andretok, in $61^{\circ} 32'$, nearly 210 nautical miles down the coast, before headway could be made to the northward and a landing at a suitable place effected. This was reached, at last, at Umiavik, in lat. $64^{\circ} 30'$, and the crossing of the inland ice was commenced on the 15th of August. A course was at first set towards the north-west for Christianshaab, in Disco Bay, but much time being lost through severe northerly snowstorms, Dr. Nansen was compelled to turn to the westward, for the nearer settlement of Godthaab. The western coast was reached after forty-six days' travelling, the distance from the point of departure being 280 geographical miles. For several weeks they were at an altitude of more than 9000 feet above sea-level, and suffered from snowstorms and loose snow and a temperature of between 40 and 50 degrees below freezing. The low land on the western coast was reached at the end of September. It is much to be regretted that the last Danish ship of the season was unable to wait a few days for the arrival and embarkation of the whole party, and, in consequence, Dr. Nansen, with his companions, remain for the winter in Godthaab.

Further Explorations in Iceland by M. Thoroddsen.—M. Thoroddsen, the geologist, to whose travels in Iceland we have had occasion to refer before,† took advantage of the peculiarly favourable weather last summer to prosecute further his explorations in Iceland. At the commencement of August he made an exploration of the volcano Raudukambar, from an outbreak of which in the middle of the fourteenth century many homesteads were, according to an old chronicle, ruined. These ruins still exist, and had never before been properly explored by a geologist. M. Thoroddsen is of opinion that they result from an eruption of Mount Hecla, which took place in 1341. In any case he states that Raudukambar is not a new volcano, but an old liparite ridge, and that there has been no eruption in its vicinity within historical time, although some old pre-historic craters exist in the lower parts of the valley. Raudukambar must therefore be struck out of the list of the active volcanoes of Iceland. Later on M. Thoroddsen paid a visit to the little-known district in the south of Hofsjökull, and between the latter place and Langjökull, where he explored the Kerlingarsfjöll, a remarkable chain of mountains which had not previously been visited by any traveller. This important range, which stretches from north to south, and not, as Gunnlaugsson's map has it, from east to west, is composed almost exclusively of liparite. Hot springs are known to exist in this region, but no one has yet come across any. Boiling quagmires of different colouring are found in many

* *Ante*, p. 591.

† *Ante*, p. 306.

places, and the steam rises up from the ground in innumerable spots with a noise like that of the discharge of steam from a locomotive. After exploring these mountains the traveller journeyed to Lake Huitarvatn, the form of which is quite different from that given to it on the map referred to above. Two glaciers stretch down into the lake, which is full of great pieces of ice from these glaciers. He then made an excursion to the north-eastern part of Langjökull, where he spent a few days in Hveravellir, which had not been explored since Henderson's visit in 1815. Important changes have taken place there. The well-known "roaring mountain" has ceased its activity. Finally, M. Thoroddsen proceeded to the south-western part of the island, where he made a geological exploration of the neighbourhood of Baula, and discovered two new "finding" grounds for plant petrifications.

Forests and Arid Lands.—Major J. W. Powell, Director of the United States Geological Survey, has recently made a valuable contribution to the discussion of the subject of forest-growth on arid lands, the effect of winds, and the extent to which irrigation may change the agricultural climate of plains. Major Powell refers specially to the conditions in the United States, and according to *Science*, he states that the plains are treeless because they are arid. There is an opinion widely existing in the popular mind, and springing up in the current literature of the West, which is the contrary of this, namely, that the dryness of the climate is the result of the lack of forests. An argument in favour of tree-planting and forest culture has often been based on this error. The effect of forests on rainfall has been investigated by many methods, in many countries, and at many times, and the result of all this investigation shows, according to Major Powell, that the presence or absence of trees influences the general rainfall or amount of precipitation only to a very limited degree. It is, in fact, not certain that their presence does increase rainfall but it is certain that, if it does, the increase is so slight as to play but an insignificant part as a climatic factor. Yet forests, or abundant trees, Major Powell states, exert an influence upon climate in its relations to agriculture. Two ways in which this influence is exerted are worthy of careful consideration. First, while it is not probable that forests diminish or increase the total amount of rainfall in any country, yet it appears that forests regulate this rainfall, so that there are fewer fierce storms and more gentle rains. When the rains fall in storms, the water is speedily gathered into streams, and at once passes from the country; but, when they fall in gentle showers, time is given to moisten the soil and invigorate vegetation. Second, forests provide against the speedy evaporation of the water, by protecting the lands from the fierce rays of the sun, and more especially by protecting the land from the rapid passage of dry winds, which drink up the water from the soil and growing plants with great avidity. It is manifest that the effects of the forest upon the great

movements of the atmosphere must be very slight when due regard is given to proportions between cause and effect. Forests can effect only the winds close to the earth by creating a friction at the surface; but the soil and the smaller plants growing therein, may be greatly sheltered by trees; though the general climate may be scarcely affected, the agricultural climate may be materially modified. The relation of forests to humidity, and of prairies and plains to aridity, should be clearly understood. In general it may be stated that, other things being equal, the dryer the climate the smaller the forests; the wetter the climate the greater the forests; for although the rainfall may be sufficient to grow forests, it may not be sufficient to protect them from fires. The great plains and the valleys of the Rocky Mountains are all capable of sustaining forests of certain trees adapted to the climatic conditions found therein. The amount of rainfall necessary to produce forests in any given latitude will depend to some extent upon the character and conditions of the soil, some soils needing more rain than others for this purpose; but the soil condition has narrow limits. Great areas of uninhabited land cannot be redeemed and protected: the protection must come from men living on the land, and utilising it for agricultural and pasturage purposes. The way in which this can and will be done may be briefly and crudely sketched as follows:—Adown the valleys and across the plains flow many streams of water—brooks, creeks, and rivers—that have their sources in the mountains by which the arid lands are dissected; and all of these streams can be utilised to irrigate the dry and parched lands that now present the desolation of deserts. By their use many tracts of land scattered far and wide throughout the whole country may be brought under cultivation and covered with growing fields and luxuriant groves. In this manner populous and prosperous settlements may be distributed throughout that land of drying winds and scorching suns. When industrious and thrifty people once get a foothold in this manner, they plant orchards and vineyards, and surround their farms and fields with trees, and plant them by the roadside, and every man devotes a part of his farm to timber-culture, and the naked lands are speedily covered with a rich vegetation. A generation ago the prairie region east of the Missouri river was so destitute of forests that large districts were supposed to be practically uninhabitable; but since that time it has been covered with orchards, vineyards, and groves, and now from the lands that were once so naked millions of trees spread their branches to the breezes. In the same manner, by means of artificial irrigation, great tracts of land will be cultivated throughout the arid country, and diversified groves will be developed. But not all the arid lands can be redeemed, as the water of all the living streams is inadequate to the task; but the intervening land will be utilised for pasturage purposes, and will be protected by the people from fire, groves will be planted, and the face of the country not under culti-

vation will be forested. In conclusion, Major Powell maintains that a large body of the arid lands can be redeemed by irrigation, and that the agriculture resulting therefrom will be in the future, as it has ever been in the past, the highest condition of agriculture. For the agriculture which is dependent upon rains is subject to storms on the one hand, and to droughts upon the other; but when the water supply is properly controlled by the arts of man, the soil is made to yield its most abundant returns. Secondly, that under the culture and protection of man, vineyards, orchards, and groves can be established over vast areas, where, under the control of nature, only deserts are found. Thirdly, the siroccos of the Great Plains cannot be tamed, but men may protect their houses, their gardens, and their fields from devastation by them. Fourthly, the lightnings of heaven cannot be employed to bring rains upon the plains, but electricity may be used to illumine the cities and towns and hamlets that must ultimately spring up over all that land.

Chandless River, Brazil.—In a former volume of the ‘Proceedings’* we have stated that the Brazilian travellers and settlers on the upper Purus had *proprio motu* given the name of the original explorer of the Purus to one of the large tributaries of that great river, which is now one of the principal indiarubber regions in the Amazons valley. We are now informed by Mr. Orville Derby, of Rio Janeiro, that the Chandless river, the locality of which we did not precisely indicate in our former note, is the stream named “Large Igaripé,” situated on the left bank, in lat. about 10° 30' S. and long. 71° 20' W., a few miles below the river Manuel Urbano.† Mr. Derby adds that the inhabitants of the Purus feel a certain amount of pride in having thus rendered homage to the English explorer of their river, and that he hopes cartographers will take note of the name.

Observations on Lake Valencia (Venezuela).—Lake Valencia, one of the largest of the few fresh-water lakes of South America, was visited last year by Herr E. von Hesse-Wartegg in the course of his travels in the northern part of South America. The lake has been explored and described by many travellers, from Humboldt in the beginning of the present century, down to Dr. Sievers in 1886; but the observations of v. Hesse-Wartegg on the continued desiccation of the lake are of fresh interest and value, while the general information obtained by him will serve to enlarge and render more accurate our knowledge of the lake and its surroundings. We extract the following notes from a paper by the traveller, which is published in the current number of ‘*Petermann's Mitteilungen*.’ That the waters of this lake, situated as it is in one of the broad high valleys of the Andes, and less than 15 miles from the Caribbean Sea, are receding at a rapid rate is an interesting fact; but

* Vol. vi. (1864) p. 402.

† Vide Chandless's map of the Purus, in ‘*Journal R.G.S.*,’ vol. xxxvi. p. 87.

the reasons of it are not far to seek. In the first place, there is no doubt that the connection between the lake and the basin of the Orinoco, which at one time was—according to the author—still more decided than at the present time, robs the lake of a great part of its surplus waters. To such an extent does the Rio Pao drain off this surplus that there is, so the traveller was informed, a difference of only seven feet between the highest level of the water during the rainy season, and the lowest level during the dry season. In the second place, the gradual destruction, by the cattle-breeders, of the forests which formerly clothed all the valleys round the lake, has had an important effect in reducing the water supply of the lake through its tributary streams, of which there are 14, not 22 as supposed. Humboldt gives the length of the lake as 35 miles; Hesse-Wartegg found it to be only $30\frac{1}{2}$ miles. Its average breadth Humboldt estimated at 8 miles, while at its widest part it measures $11\frac{1}{2}$, according to the more recent traveller. The town of Valencia, built in the year 1555 at a distance of half-a-mile from the shore of the lake, was, in Humboldt's time, $3\frac{1}{2}$ miles away, and is now nearly 5 miles distant. At one time the little village of Los Guayos was the port of Valencia, but it is to-day $2\frac{1}{2}$ miles away from the shore. Other facts might be cited showing how greatly the waters have receded. The traveller ascertained the depth of the lake at 28 points, which he indicates on the map accompanying his paper; the greatest depth was found to be 51 fathoms. The temperature of the water varied very little throughout the day. In the morning it averaged 73° , and in the evening 75° to 76° . The water is not at all clear and limpid, but contains a quantity of organic matter, though only very few mineral substances. It is not drunk by the inhabitants, as they believe it induces fevers and other disorders. The lake contains 22 islands (Humboldt says only 15), but in former times probably double that number dotted its surface. Only three of the islands, viz. Burro, Culebra, and Ottama, are inhabited; the rest have steep shores and are thickly wooded. Hesse-Wartegg observed on the islands visited by him a well-defined old shore-line, about 10 feet above the present level of the lake, and he is of opinion, from various considerations, that the lake may have been at that level as recently as during the last century.

The State of Wheat Culture in Chile.—The following notes are extracted from a Report (No. 407) by Consul Newman, recently issued from the Foreign Office, on the condition of agriculture in Chile. As far as can be judged the proportion of wheat grown in Chile has not increased for a good many years. New lands have been taken up on the Indian frontier in the south, and the average has been thus increased, but year by year the old irrigated lands between Santiago and Chillan are going out of wheat cultivation, and are being used for cattle-feeding. This, and also the cultivation of vineyards on the slopes, and the production of barley and hay, are found to give a better return in the

northern and older districts than wheat-growing—the reason being the immense increase of consumption of feeding stuffs in the nitrate districts, where many thousands of mules have to be fed entirely on barley and hay imported from the south. The nitrate-producing province of Tarapaca and the mining province of Atacama are absolutely barren deserts. The following figures represent roughly the export of wheat for the last six years:—1882, 150,000 tons; 1883, 120,000 tons; 1884, 100,000 tons; 1885, 95,000 tons; 1886, 120,000 tons; 1887, 110,000 tons. Of this amount Peru now requires annually about 15,000 tons, in place of from 25,000 to 30,000 tons eight or ten years ago; Peru having, for various reasons, drawn largely from Australia and California of late years. The consumption of flour in Chili is very large in proportion to the population, and amounts annually to about 120,000 tons; about 15,000 tons are exported every year to Central America, Ecuador, and Bolivia.

Climate of the Falkland Islands.—The Annual Report (No. 30) for 1887 of Governor Kerr upon these islands contains the following information with regard to the climate, for which, the Governor states, he is indebted to Mr. Cobb, of the Falkland Islands Company:—The mean temperature of the various months of the year was, January, 50·9; February, 52·1; March, 49·8; April, 43·4; May, 41·3; June, 34·6; July, 37·5; August, 34·0; September, 36·2; October, 43·3; November, 48·5; December, 49·7; the mean for the year being 43·4. Rain fell on 234 days, and the total fall amounted to 28·24 inches. The greatest quantity of rain fell in January and June, and the least in October and November. The average humidity was 86. The wind is described as “stormy” on 62 days; “strong breeze,” 70 days; “fresh breeze,” 39 days; “moderate,” 75 days; “light,” 113 days; and “calm” 6 days. The population of the islands on 31st Dec., 1887, was 1843, showing a slight increase over that of the previous year.

Trade in the Territory of the British North Borneo Company.—We have taken the following information from a Report (No. 420) by Mr. W. B. Pryer, an officer in the service of the British North Borneo Company, and holding the post of Resident on the east coast, which has been published by the Foreign Office. The imports for the year 1887 show a comparatively large increase over those of the previous year, and amounted to 191,730*l.* as against 169,823*l.* in 1886; in 1878 the total was only 3200*l.* The exports are not quite so satisfactory, and show but a slight increase, the figures being 107,053*l.* against 104,945*l.* Up to the present time the business of the country, with the exception of the export of sago from the west coast and of some timber, has been almost entirely confined to barter by the natives of natural jungle and sea-produce for T-cloth, and calico, hardware, rice, &c. The enormous supply of timber in the country, and in the Sandakan District especially, has, however, attracted considerable attention, and means are being taken

to develop the trade, which, in view of the increasing scarcity of timber in the East, is likely to become important. The cultivation of "wrap" tobacco, similar to that grown with so much success in Sumatra, is being tried, and the results of this year's crop are being awaited with great interest. Pepper, too, is being cultivated largely, and appears for the first time in the list of exports for 1887. Amongst other things it is proposed to give attention to indiarubber and rattans. Both these plants are indigenous, and grow wild in the forest. During the year 1887 applications were received by the Commissioner of Lands for 278,335 acres of land, of which 218,000 were applied for by Dutchmen and 60,000 by Englishmen. One or two expeditions were made during the year up the Segama river to the reported gold-fields, but the river route by itself was found to be impracticable, owing to the numerous rapids and cascades. The British Borneo Gold-mining Company was making arrangements for despatching an expedition to thoroughly explore the head-waters of this river. The Report concludes by stating that the past year has been a very satisfactory one, and that the pressing need of the country, which has great advantages in the way of forest produce, soil and climate, is population.

The Dutch Boundary-line in North-eastern Borneo.—Col. Versteeg, the President of the Dutch Geographical Society, has sent us a continuation of the correspondence on this subject, which our Council think it inadvisable to publish, as the further discussion does not seem to have any direct relation to Geography, but to be rather of a political nature.

Trade in Siam.—The Report of Mr. E. B. Gould, our Consul at Bangkok, for 1887, on the trade of Siam, contains the following information:—The export of rice during 1887 was by far the largest yet known, being 402,046 tons (value 1,918,783*l.*); the next best year being 1884, with 274,300 tons. Teak is now established as the second great export article. The total value of the exports from Bangkok for 1887 was 2,598,901*l.* as against 1,728,807*l.* in 1886; of this amount Hong Kong took 1,484,064*l.* and Singapore 754,449*l.* With regard to the imports there is little to be said, as they were normal. Sugar, which once used to be exported considerably, now appears as an import, the home-production having become gradually less and less.

The Progress of Basuto-land as a Crown Colony.—The Report (No. 31) of the Resident Commissioner of Basuto-land for 1887 has just been published by the Colonial Office, and it is interesting as showing the progress made by the country in commercial and other directions, since it became subject to direct imperial rule four years ago. The reports from all the various districts agree in testifying to the improvement of trade. Wheat, the staple production of the country, has been everywhere grown with success, and the past harvest has been good. The market for grain, however, is limited. Kimberley is largely

supplied from Basuto-land, but the competition from the Orange Free State is keen. The population is increasing in all directions, and should the stream of immigration continue, it is feared that particular districts will be overstocked. In October 1887 the Resident Commissioner visited the little explored part of the Malutis, and found the mountains more populated than he had expected. It appears that a question has lately been raised as to the identity of the Caledon river described in the Treaty of Aliwal North as forming a portion of the northern boundary of Basuto-land. This is now being investigated.

Explorations in German Togo-land.—Great activity is still being displayed by German explorers in the interior of Togo-land.* Captain C. v. François has brought to a successful termination his journey into the country confined within the great bend of the Niger. The route taken by him was as follows, viz. Kpandu, Salaga, Jendi, Gambaga, and then across the upper course of the Volta at Bupere (the river at this spot, though more than 80 yards broad, is no longer navigable). From this point he arrived, on 19th April last, at Surma ($11^{\circ} 28' \text{ N. lat.}$) in the country of Mosi. He afterwards made an excursion from Gambaga to the south-west by way of Nantong, to the river Volta, and returned to the coast through Adeli. In the latter place he met Dr. L. Wolf, who founded a station there on the Adado Mountains in the beginning of May, having travelled to Adeli through the eastern part of Togo-land. Dr. Wolf has, with the aid of a mercurial barometer, been able to determine numerous altitudes with greater accuracy than any measurements previously made in this part of Africa. It appears from his results that Dr. Henrici has considerably over-estimated the height of the Agome Mountains.—Herr v. Puttkamer, the Imperial Commissioner, made in March an excursion into the region of the French Protectorate as far as the lower course of the Mono, and then explored the country of Agotime up to the foot of the mountains. All these travellers agree in stating that the prospects of the interior of Togo-land are very favourable, both as regards agriculture and commerce; the climatic conditions of these uplands are much more favourable than those of the coast.

Map of the Cameroons District.—The map of the Cameroons region in our October number (with the exception of the ethnographical details and some additions) was taken from Von Danckelman's map published in the second Heft of the 'Mittheilungen aus den Deutschen Schutzgebieten.'

* 'Proc. R. G. S.,' 1886, p. 789.

REPORT OF THE EVENING MEETINGS, SESSION 1888-9.

First Meeting, 12th November, 1888.—General R. STRACHEY, R.E., F.R.S.,
President, in the Chair.

PRESENTATION.—*Capt. G. W. Read.*

ELECTIONS.—*Lieut. H. W. A. Crichton-Browne (3rd Bat. King's Scottish Borderers); James J. Fellowes, Esq., J.P.; Edwin Hunt, Esq.; Lieut. G. Swayne, R.A.; G. A. Troye, Esq.*

In opening the Meeting the PRESIDENT said he had much pleasure in again meeting the Fellows at the commencement of another Session. He desired to remind them that it was by the favour of the authorities of the London University that they were able to occupy that magnificent Hall, which was so extremely well suited to the purposes of the Society. To those authorities their very best thanks were due. It had been the practice for some years past for the President of the Society to make some short reference to matters of geographical interest that had occurred since the close of the last session, but on this occasion he had found so little of importance to speak about, that he had not thought it desirable to do more than make a very few remarks, which he regretted to say would not be otherwise than of a mournful character. In the first place, it would be impossible for him to pass over the occurrence of the death of that very eminent traveller, General Prejevalsky, who had done so much for the exploration of Central Asia. General Prejevalsky was on the point of starting for a further journey into Tibet, and, at all events, with the object of penetrating into that country, when he was unfortunately seized by the disease which carried him off. He was a Gold Medallist of the Society, and every one present would join in regretting the loss of so distinguished a man. He had next to refer to the very untimely death of two English gentlemen, Mr. Donkin and Mr. Fox, in the Caucasus during the past summer. It was still uncertain what were the exact circumstances under which they met their death, but there was very little doubt that in crossing one of the larger glaciers they were overwhelmed by an avalanche. While expressing the sympathy of the Society for this lamentable event, he wished to say that he had reason to believe that the Russian officers in the vicinity where the accident occurred had done everything in their power to ascertain the causes of it, and they had shown in every possible way their sympathy with the families of the unfortunate gentlemen. His last reference was to the extremely unhappy deaths of Major Barttelot and Mr. Jameson, two members of the expedition that was sent from the Congo to relieve, or at all events to support Mr. Stanley. The fate of Mr. Stanley himself was still involved in obscurity, but so far as the opinion of the most competent judges was concerned there was at present no greater reason than before, except from the absolute lapse of time, why he should not once more appear before the world after his long eclipse in the darkness of Central Africa. He trusted that Mr. Stanley's well-known courage and perseverance would enable him to conquer the difficulties which he had no doubt met with.

The paper read was:—

"The Niger Delta." By H. H. Johnston, Esq., Her Majesty's Vice-Consul for the Oil Rivers and Cameroons. (*Ante*, p. 749.)

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Berlin, November 3rd, 1888: BARON VON RICHTHOFEN in the chair.—Baron von Richthofen was again elected President for the year 1889; Dr. Reiss was chosen as the first Deputy-Chairman and Dr. von den Steinen as the second.—Dr. Philippson spoke upon settlement and commerce in Morea. The intensive formation of Europe in horizontal and vertical directions reaches, he said, its maximum in Greece. No territory in this part of the world presents so many promontories and gulfs, so many mountain chains, depressions, and indentations as Greece, and especially the Peloponnesus. But the interest which this little corner of the earth can claim as the cradle of our civilisation does not correspond with our knowledge of its physical features and history. The exploration of the physical geography of Hellas is still greatly in arrear. It still rests mainly upon the surveys executed by French officers after the battle of Navarino, which, meritorious though they are, contain nevertheless numerous errors. Geologically the Peloponnesus, with the exception of the region of the Isthmus of Corinth and of Olympia, is a *terra incognita*. The Peloponnesus is wholly a country of mountains, except that it lacks one great dividing range. It is also deficient in longitudinal valleys opening up the mountain masses, and in extensive plains. Of the latter there are only those of Argos, Messenia, and Elis, and these are of but small extent. The river systems have furrowed the country deeply, and are very much interlocked. Commerce is hindered less by the mountain ranges than by the deeply eroded narrow river-valleys with their steep sides and precipitous slopes. It is the difficulties presented by the nature of the country to trade which have prevented the Peloponnesus from ever being ruled from a native centre, and which are also the cause why it has never been completely subjugated by the numerous peoples—such as the Goths, Slavs, Avars, Bulgarians, Albanians, Normans, Venetians, Turks, &c.—which in the course of time have invaded it. The traveller often finds purely northern characteristics, reminding him of the German or Slav, especially in the mountain villages of Arcadia. Only one of these elements of population, however, has preserved its language, and that is the Albanian. Nearly all the men have, it is true, mastered the Greek language, but among themselves they make use of the Albanian idiom. The women for the most part do not understand Greek. At least 90,000 of the 700,000 inhabitants of Morea use the Albanian language. The Albanians inhabit principally the peninsula of Argolis, with the exception of a strip of country from Nauplia across to Epidaurus, also Corinthia as far as the Ziria mountains, isolated villages in the province of Stymphalis and on the Voidias mountains, as well as in the plain south-west of Patras; and lastly, seventeen villages in Messenia, between Kyparissia and the upper Messenian plain. There is no national contrast between the Albanians and Greeks; the Albanian language is not written and is not fostered by the Albanians themselves. An Albanian village does not differ from a Grecian; all over the Peloponnesus the conditions of life are the same. There is no industry, with the exception of a few silk-spinning houses in Patras. Coals, wood, minerals, and water-power, but especially workmen and capital, are lacking everywhere. Trade also is very unimportant. The single commercial town is Patras, which is occupied almost exclusively with the exportation of currants and the importation of cereals. The carrying trade is practically *nil*. Of the 1300 vessels composing the Grecian merchant-fleet, 50 only belong to Peloponnesian harbours. Italian and Cretan fishermen carry on their business on the coasts. Agriculture and cattle-breeding form the only sources of industry. Currants are the most important product of the peninsula. In 1887 the export of currants amounted to 2,180,000*l.*, which was just half of the total exports, and exactly equal to the import of cereals. Thus Greece pays for her bread with currants. The latter flourish only under special climatic conditions. Nowhere are they cultivated on a larger scale than in Greece, and outside the Peloponnesus only in the Ionian

Islands and on the south coast of Ætolia. Currants cannot be cultivated above 1150 feet, and for some unknown reason they do not thrive on the east coast of Morea. Their cultivation is very remunerative, and has in consequence superseded all other cultivation, even that of the olive. As the eye wanders over the plains of the west and south of Morea it sees nothing but the uniform series of currant-bushes. Oranges, citrons, and figs remain confined to the vicinity of the villages. Since the cultivation of currants brings much money into the country, these are the parts of Morea where European civilisation, commodities, and tastes have made the greatest advance. Out of eight towns with over 5000 inhabitants, six are found in the currant-growing district, still only Patras with its 30,000 inhabitants deserves the name of a town in the European sense. The cultivation of the olive does not extend beyond 1300 feet; in Morea it is now confined chiefly to the east coast districts, where the currant does not flourish. Above these regions we find the cultivation of corn prevails in company with the vine and fruit-trees. Maize and the vine are cultivated up to a height of 3600 feet, and corn up to nearly 5000 feet above the sea-level. The most elevated districts where agriculture is pursued lie at a height of about 4000 feet. Above these regions there exists a nomadic population who carry on cattle-breeding, and in the winter descend with their flocks of sheep and goats into the lower altitudes. The fields do not lie together, but are widely scattered over the stony and bare mountain slopes. This prevents the concentration of the population, and no large communities are met with, but at the same time there are no isolated farmsteads, on account of the great insecurity which prevailed in earlier times. The position of villages is determined by the presence of springs. The market-place is generally shaded by a very old, immense plane-tree. The houses are built of stone, on account of the scarcity of wood, and have in the mountain villages, as a rule, only one room, in which the inhabitants live with their domestic animals. The shepherds dwell in huts made of fir twigs or felt; they hail mostly from the middle of Greece. The villages in the interior of the country produce nearly everything which they require; cheese is the principal export. Tripolis in Arcadia is the only important centre of commerce in the interior. On the east coast there is a series of good harbours, such as Pylos, Poros, &c., still they are deprived of the produce of the country which lies shut off in their rear. The most productive parts of the country have almost exclusively open roadsteads, and it is only during the beautiful weather, which nearly always prevails during the summer, that ships can anchor without danger at almost every point on the coast. With respect to railways the following only exist, viz. the Athens-Corinth-Argos-Nauplia, the Argos-Myli, and the Corinth-Patras. There are narrow-gauge coast railways. The extension of the Argos-Myli line, by way of Tripolis to Kalamata, which has been begun, gives great hopes of success. The only existing high-road of any great importance is the Corinth-Argos-Tripolis-Megalopolis and Kalamata road, which is the forerunner of the projected railroad above referred to. Wagons are still unpopular all over Greece; they have been introduced from Europe; among the Greek farmers not even carts are used. Many of the Government roads have in places fallen completely into decay, and are in a breakneck condition. The common means of transport in all parts of the country are consequently still horses, mules, and asses, which possess an astonishing amount of activity in climbing, and also great powers of endurance. Even the mule-paths between great centres, such as Pyrgos and Tripolis, in their completely neglected state defy all description. Money is very seldom met with in the mountain villages, and the primitive method of trade by barter still prevails in this ancient land of civilisation. The conditions of life in Hellas and Central Europe are completely different, and the Greek rightly distinguishes between Hellas and Europe, for which he entertains a certain superstitious reverence.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.E.S.*)

EUROPE.

[**Germany.**—*Handbücher zur Deutscher Landes- und Volkeskunde.* Herausgegeben von der Central-Commission für wissenschaftliche Landeskunde von Deutschland.—*Geologie von Deutschland und den angrenzenden Gebieten* von Dr. Richard Lepsius. Erster Band, Lieferung 1. 8vo., pp. 254. Price 11s. 6d. —*Die Gletscher der Ostalpen.* Von Dr. Eduard Richter. 8vo., pp. vii. and 306. Price 12s. Stuttgart, Engelhorn, 1887–8. [Presented by the Publishers.]

These are the first two volumes of a series of publications on the land and the people of Germany, which have apparently a more popular character than the special series of memoirs which are being issued by the Central Commission. Dr. Lepsius's *Geology of Germany*, when complete, will be an invaluable work of reference, as his treatment of the subject is mainly systematic.

Dr. Richter's volume is a statistical account of the glaciers of the Eastern Alps, from the Ortler to the Ankogel, divided according to their groups. The details are very minute and, so far as we have tested them, accurate. In the reference to literary authorities, English publications are entirely ignored! The amount of ground covered by ice in the region dealt with is estimated at 1462 square kilometres; the number of glaciers at 1012. The Ötztal and Stubay groups contain by far the most extensive glacier systems. The height of the snow-level is given as varying from 9515 feet to 8859 feet. The recent oscillations of the glaciers are recorded; meteorological statistics are also given. In short, the volume bristles with figures and observations. A few maps of some of the smaller glaciers are inserted.

Wood, Charles W.—*Letters from Majorca.* London, Bentley & Son, 1888: 8vo., pp. xiii. and 410. Price 14s. [Presented by the Publishers.]

Mr. Wood's book reveals a region as unknown to most readers as Central Africa. It abounds with interest of many kinds, and as Mr. Wood saw a great deal of the Balearic Islands during his stay, and describes what he saw very attractively, his book will be of great service as a guide to future visitors. The book is richly illustrated, but there is no map, no table of contents, and no index.

Zapiski Imperatorskago Russkago Geographicheskago obshchestva.—*Memoirs of the Imperial Russian Geographical Society.* Ethnography, vol. x. part 3, pp. 50. St. Petersburg, 1888.

This is a collection of Kirghiz stories, translated and edited by M. Miropief, treating of the demonology of this people. It is only about a century ago that Muhammedanism began to make its way among the Kirghiz, the Russians under Catherine II. doing their utmost to promote the propaganda of this religion. Entering the steppe from two sides—from Kazan and Orenburg on the west, and from Khiva and Bokhara on the south—it was not long before Islam made numerous converts; and at the present day the Kirghiz have almost forgotten the heathen rites and superstitions of their forefathers. Hence these stories are of some interest, inasmuch as they show what little yet remains of the old religion among these semi-nomadic tribes of Central Asia. The Kirghiz and Russian are printed in parallel columns.—[E. D. M.]

ASIA.

[**Ainsworth, W. F.**—*A Personal Narrative of the Euphrates Expedition.* London, Kegan Paul, Trench, & Co., 1888: 8vo., vol. i. pp. xiv. and 447; vol. ii., with Appendix, pp. 492. Price 32s. [Presented by the Publishers.]

The name of the venerable author of these volumes is well known to English readers, and to no section of these better than Fellows of the Royal Geographical Society, of which Mr. Ainsworth is one of only four surviving

original members. Appointed at the end of 1834 to be surveyor and geologist to the Euphrates Expedition, then fitting out at Birkenhead under the able superintendence of Colonel Chesney, its intended commandant, he was not long in showing that, in addition to fitness for the duties entrusted to his hands, he possessed also those qualities which make a distinguished archaeologist and geographer. In 1838 he published his 'Researches in Assyria, Babylonia, and Chaldæa,' and four years later his 'Travels in Asia Minor, Mesopotamia, and Armenia.' About the same period he contributed to the Journal of the Royal Geographical Society three sets of notes—one "Upon the Comparative Geography of the Cilician and Syrian Gates," a second "On a Journey from Constantinople by Heraclea to Angora," and a third "On a Journey from Kaisariyeh by Mataliyya to Bir or Birehjik." So recently as in 1884 his pen was exercised in supplying to the Society's 'Proceedings' an interesting letter on his identification of the Pinarus with the Dele Chai.

In the preface to vol. i. the *raison d'être* of the present work is explained to be the non-appearance hitherto of a personal and popular narrative of Chesney's expedition to the Euphrates, which is indeed justly designated "without a parallel in the history of similar undertakings, alike for the novelty and magnitude of the enterprise, for the scale upon which it was got up, for the difficulties it had to encounter, and for the importance of the results obtained." Admitting the plea, which many will be disposed to do, it would not be difficult for an impartial critic to accept Mr. Ainsworth as fully warranted, by talents and experience, to supply the deficiency. That he goes over certain portions of ground which his readers have gone over with him before, is of little moment at the present day, when *all* information on the land of an inevitable railway—not inferior to any in commercial importance—should be rendered available in every readable form. A record of a life's experience such as this needs, moreover, no excuse, even if it involve repetition of matter already submitted to public attention. The case is somewhat parallel to that of Sir Austin Layard, who lately supplemented his account of scientific exploration with two pleasant volumes of personal narrative. Only the Euphrates explorer reverts, perhaps, more longingly and frequently to his old classical world, identifications, and archaeological arguments.

More space than can here be given would be needful to do justice to the volumes before us. Their contents may be briefly summarised in the statement that they consist of seven books, or divisions, respectively headed:—The Transport; Winter Wanderings; The Descent of the River; Babylonia and Khaldæa; Wanderings in Persia; Ascent of the Euphrates, Tigris, and Karun; and Kurdistan and Asia Minor. It will be seen at a glance that some of these, such as the fifth and seventh, are not logically to be comprehended in the general title; but they are none the less pertinent and instructive. Book vii., on Kurdistan and Asia Minor, has, for instance, a special value in its more than incidental notice of the Jacobite Christians. If coupled with the same writer's account of the Chaldæans (now spelt, it is observed, Khaldæans), published in 1841, a valuable reference would be obtained for two of the chief denominations of Oriental Christians. Why the terms Khaldæan and Jacobite are used, however, appears perplexing. If Khaldæan be correct, the other would naturally be Syrian, or West Syrian: whereas if Jacobite be correct, the other would be Nestorian. The proper designation is probably Khaldæan and West Syrian; for that of Nestorian and Jacobite is applied by the Roman Catholics to those whom they would indicate as heretics.—[F. J. G.]

[India Office Library.]—Catalogue of the Library of the India Office. Vol. i. and Index. London, Eyre and Spottiswoode, 1888: 8vo., pp. 567, (Index) 207. [Presented by the Secretary of State in Council of India.]

Isvestiya Vostochno-Sibirskago otdiela Imperatorskago Russkago obshestva.—Proceedings of the East Siberian Branch of the Russian Geographical Society, vol. xix. parts 1-3. Irkutsk, 1888.

The contents of these parts are as follows:—

Part 1.—A short preliminary report on the geology of the Sayan expedition, by L. A. Yachefsky; salts contained in Lakes Gashiun and Baga-chikyr, by

V. Tikhomirof; information on the quantity and prices of furs, musk, and mammoth tusks brought to the fair at Irkutsk in 1887; and transactions of the section. A map showing the route taken by the Sayan expedition accompanies the number.

Part 2.—First supplement to the list of plants in the government of Yeniseisk, by Y. Prein; materials for statistics of trade and industry in the city of Irkutsk, by S. Chudnofsky; the Kadinian rock inscription, by Pliaskovitsky, with three plates of drawings; transactions of the section.

Part 3.—*Zegeteh-aba*, modes of arranging battues by the ancient Buriats, by Khangalof; incantations and prayers of the peasants of Minusinsk; transactions of the section.—[E. D. M.]

[**Krakatoa.**—The Eruption of Krakatoa and subsequent phenomena. Report of the Krakatoa Committee of the Royal Society, viz. The Hon. Ralph Abercromby, E. Douglas Archibald, Prof. T. G. Bonney, F.R.S., the late Sir F. J. Evans, F.R.S., Dr. A. Geikie, F.R.S., Prof. J. W. Judd, F.R.S., J. Norman Lockyer, F.R.S., the Hon. F. A. Rollo Russell, R. H. Scott, F.R.S., Prof. G. G. Stokes, Pres. R.S., Lt.-General Strachey, R.E., F.R.S., G. J. Symons, F.R.S. (Chairman), Capt. W. J. S. Wharton, R.N., F.R.S. Edited by G. J. Symons, F.R.S. London, Trübner & Co., 1888: 4to., pp. xvi. and 494. Price 30s. [Presented by the Council of the Royal Society.]

Shortly after the memorable eruption of the volcanic island of Krakatoa, in the Java Strait, in August 1883, a Committee was appointed by the Royal Society to collect and collate information on the various phenomena that attended and followed the eruption. This Committee has been at work for four years, and the results are published in this quarto volume, with all necessary maps and illustrations.

The inquiry deals with every aspect of the original phenomena and its consequences. The first section is by Professor Judd, and treats of the volcanic phenomena of the eruption and the nature and distribution of the ejected materials. This is followed by papers dealing with the air-waves and sounds caused by the eruption, prepared under the supervision of General R. Strachey. Then we are taken on to consider the subject of the sea-waves that were sent circling round the world, this section being dealt with by Captain Wharton, the hydrographer. Much the larger portion of this report, over 300 pages, deals with the unusual optical phenomena of the atmosphere, 1883-6 (for the glows continued more or less into the latter year), including twilight effects, coronal appearances, sky haze, coloured suns, moons, &c. This section is very thoroughly dealt with by the Hon. Rollo Russell and Mr. Douglas Archibald. A few pages are devoted to a report on the magnetical and electrical phenomena accompanying the explosion by Mr. G. M. Whipple, of the Kew Observatory. Finally, there are three copious indexes to persons, places, and ships mentioned in the report.

Professor Judd, in what will be regarded as the most geographical section of the report, traces the history of Krakatoa as far back as it is known. As this is the section which is likely to interest geographers most, we give the following analysis of the results:—First Professor Judd points out that Krakatoa lies in the heart of a region recognised as the greatest existing focus of volcanic activity in the globe. By means of a small map he shows Krakatoa lying on the point of culmination of two lines of volcanic fissure which appear to traverse the district at right angles. Krakatoa (about 25 square miles) and the neighbouring islets, Mr. Judd points out, are probably the wreck of what must originally have been a great volcanic mountain, with a circumference at sea-level of 25 miles, and a height of from 10,000 feet to 12,000 feet. Like so many other volcanoes, it probably had a conical form, built up by the descent of the materials which had been gradually ejected from the vent. At some unknown period the volcano became the scene of a series of eruptions—which, judging from the effects they have produced, must have been on even a far grander scale than that which five years ago attracted so much interest. Mr. Judd traces what he believes to be the history of the volcano from that point down to the time of the last eruption,

before which the island had an irregular outline, with several cones, the highest being Rakata, some 2600 feet high. The last great outbreak previous to that of 1883 seems to have been about 200 years ago. From then until about six or seven years ago there were no remarkable signs of activity on the part of Krakatoa. May 20th, 1883, appears to have been the date of the beginning of the latest volcanic episode, which culminated in the series of terribly destructive explosions of August 26th and 27th. The report contains a photograph in colours of the May eruption, which was formidable enough. Although the island was in a state of moderate activity from May onwards, there was no apprehension of any catastrophe, and the matter attracted little attention. The volcano gathered in strength during August, and showers of pumice and dust were thrown to great distances. On the afternoon of August 26th the crisis was evidently approaching, and from the logs of various ships which were in the neighbourhood Mr. Judd is able to give a connected story of the events of August 26th and 27th. Explosion after explosion occurred, filling the air with dense vapour and pumice and dust, lit up by the glow from beneath and the lightning generated above. Had Krakatoa not been surrounded by water, had it been on the mainland of Java, the outburst would no doubt have been violent enough, but the loss of human life might have been *nil*, and the attendant and subsequent results might not have been at all noteworthy. The theory that the infiltration of water, setting up enormous chemical activity, is the main cause of seismic manifestations is well known to students, and has received considerable support. From the situation of Krakatoa, a volcano emerging from the sea, situated at the meeting-point of two great fissures, this infiltration theory had necessarily to come under Mr. Judd's consideration. The result is that he repudiates it as untenable. Water, he shows, certainly did play an important part in the Krakatoa explosions, but not directly by setting up chemical activity. The exciting effect of throwing clods and stones into a geyser is well-known; an outburst almost certainly follows. The clods and stones, by covering up the surface of the geyser contents, prevent the escape of the contained gases, which, becoming pent up among the liquid, produce a condition of tension which becomes so great that an outburst of energy is the result. The continued activity of Krakatoa carrying away the sides of the craters, brought their lips down to the water edge. The result was an inrush of an enormous quantity of sea water, the first effect of which was to chill the surface of the lava, and suppress for a time its copious ejections. But another effect was to imprison the gases which were being continuously generated until in time these increased so enormously in the vast mass of lava that an explosion of almost unprecedented violence was the result. The acme of this complicated activity was reached about 10 a.m. of the 27th. There had been other explosions at various times noticed by Mr. Judd on the afternoon and evening of the 26th and the morning of the 27th, explosions which shattered the island, and produced detonations and waves which were felt at great distances. But these were nothing compared to that of 10 a.m., which, as Mr. Judd puts it, eviscerated the island, threw up thousands of tons of stuff in all stages of comminution, mixed with watery vapour, to heights estimated at from 12 to 23 miles, and gave rise to the gigantic wave which swept away 37,000 people, and propagated itself as far as the English Channel. Other explosions followed, but they were nothing compared to this. Two-thirds of the island were blown away during the eruption, sinking its centre far under the sea and filling up channels previously navigable. The missing mass of Krakatoa, according to Captain Wharton's estimate, was at least two hundred thousand million (200,000,000,000) cubic feet.

Such, in brief, are some of the leading conclusions come to by Mr. Judd from his examination of the vast mass of data relating to the phenomena immediately attendant on the eruption. Other conclusions of great interest to science are reached, which we need not consider here. By the shattering of the island a magnificent section of some 2000 feet is exposed, giving an admirable insight into the interior economy of a volcano. The composition, chemical and physical, of the various *ejectamenta* are carefully analysed, and coloured diagrams of sections given.

Wardrop, Oliver.—The Kingdom of Georgia. Notes of Travel in a Land of Women, Wine, and Song. To which are appended Historical, Literary, and Political Sketches, Specimens of the National Music, and a compendious Bibliography. London, Sampson, Low & Co., 1888: 8vo., pp. ix. and 202, maps and illustrations. Price 14s. [Presented by the Publishers.]

The geographical value of this work consists in an account of Kakhetia, the garden of Georgia, where the author spent some time as the guest of local land-owners. He gives a lively picture of its forests and vineyards, its picturesque towns, Signach and Telav, and primitive modes of travel. An on the whole judiciously selected Bibliography of the Caucasus is perhaps the most valuable part of the volume.

In points of detail the author is not always accurate. The connection of the Chevsurs with Crusaders is as much exploded as that of the Ossetes with the Germans. The fabrication of armour in the Caucasus is mentioned by Masudi, the Arab geographer. "A tur (aurochs, *Ægoceros Pallasii*)" would be indeed a strange monster! The new tunnel *under* the Suram Pass, the diversion of the Dariel road by which it entirely avoids the "mad torrent" of Kazbek, are not referred to.

We are grateful to Mr. Wardrop for his interesting notes on Georgian history and the present condition of the nation; but we entirely dissent from the conclusion he wishes to enforce, "that there is a politically homogeneous nation stretching from the steppe of Baku to the Black Sea." It is no doubt true that the Georgian language extends across the Caucasus. But that there is, for political purposes, an united rising Georgian nationality is, in our belief, the dream of coffee-house politicians, the repetition of which can only be injurious to the real interests of Georgia. There is no doubt, however, that the Trans-Caucasian Railway has brought the region into closer connection with European ideas, and excited a desire for the material development of their country among Georgian proprietors, which is at present far from being satisfied. The book has some illustrations, a map of Trans-Caucasia, and route-maps of the Trans-Caucasian Railway and the Dariel Road. In the former the distances in versts between the stations are given.—[D. W. F.]

GENERAL.

[**International Geodetic Association.**—Verhandlungen der vom 21. bis zum 29. October 1887 auf der Sternwarte zu Nizza abgehaltenen Conferenz der Permanenten Commission der Internationalen Erdmessung redigirt vom ständigen Secretär A. Hirsch. Zugleich mit den Berichten mehrerer Special-Referenten über die Haupt-Fächer, und den Berichten über die Fortschritte der Erdmessung in den einzelnen Ländern im letzten Jahre.—Comptes-Rendus des séances de la Commission Permanente de l'Association Géodésique Internationale réunie du 21 au 29 Octobre [1887, à l'Observatoire de Nice rédigés par le Secrétaire perpétuel A. Hirsch. Suivis des Rapports spéciaux sur plusieurs branches principales, et des Rapports sur les travaux géodésiques accomplis dans les différents pays en 1887. Berlin, G. Reimer, 1888: 4to., maps and plates. [Presented by the Association.]

[—] Association Géodésique Internationale. Comptes-Rendus de la Session de la Commission Permanente à Nice, en 1887. Supplément Rapport sur les Triangulations par le Général A. Ferrers. 4to., pp. 127, map. [Presented by the Association.]

[**International Geological Congress.**—Congrès Géologique International. 4^{me} Session—Londres, 1888. Explications des Excursions. Rédigées par W. Topley, Secrétaire Général du Congrès, avec la collaboration de E. Van den Broeck et J. Purves. Londres, 1888: 8vo., pp. x. and 205, maps and sections. [Presented by W. Topley, Esq.]

[—] Ditto. *Études sur les Schistes Cristallins*. Londres, 1888: 8vo., pp. 127, profiles. [Presented by the same.]

Isvestija Kavkazskago otdiela Imperatorskago Russkago geographicheskago obshestva.—Proceedings of the Caucasus Section of the Imperial Russian Society, vol. ix., part 1. Tiflis, 1885–87: pp. 224, 16, 146, and 64.

This volume opens with a report on the work done by the Section in 1884, special attention being directed to the geodetic labours of MM. Kuhlberg, Gedeonoff, and Stebnitsky, M. Buslafskey's researches on landslips from Mount Kazbek, those of the late Professor Von Koshküll on the naphtha springs of Trans-Caspian, and his translation into Russian of the late Hermann von Abich's great work on the geology of the Caucasus. In the department of anthropology and ethnology, M. Egiazarof has done good service by collecting juridical customs of Caucasian tribes. Referring to the Afghan Boundary Commission, the names of MM. Lessar, Konshine, Alikhanof, and Regel are mentioned as having specially distinguished themselves. Kondratenko's photographs in the territory about Merv are also noticed. Meteorology has been well represented by M. Mühlberg, of the Tiflis Observatory, while MM. Dinnik, Rossikof, and Radde have contributed excellent work towards a knowledge of the avi-fauna, though in this branch of science Prof. Bogdanoff's 'Birds of the Caucasus' deserves a high place. The year 1884 was rendered memorable by the ascents of Elbruz and Adai Choch by M. Déchy, our Honorary Corresponding Member, with Alpine guides. M. Ivanof also attempted Elbruz, but did not reach the summit, his highest point having been 15,340 feet. M. Cherniavsky's able treatise on the Crustacea of the Pontine Littoral, published in the Transactions of the Kharkoff Society of Naturalists, is also noticed, besides various publications in foreign literature chiefly relating to the new Trans-Caspian possessions of Russia and Asia Minor.

Among the longer papers contained in this volume is one by Prince Masalsky, giving the results of his travels in the southern part of the Kars district; materials for the geology of the Caucasus by MM. Batsevich, Sorokin, and Simonovitch; M. Konshine's monograph on the geology and physical geography of the Trans-Caspian region; a communication by M. Eliséief on his travels in Asiatic Turkey; a list of heights and astronomical positions along the Trans-Caspian Railroad, &c.

Obituary notices, with portraits, are given of the late Hermann von Abich and Prof. von Koshküll. The appendix contains a description of the lake formed in 1884 in the Persian province of Kum, by A. A. Melnikof, late Russian Ambassador at the Court of H.M. the Shah; a journey in North-Western Persia, by General Houtum-Schindler, edited by J. Stebnitsky; Lt.-Col. Beresford Lovett's notes of a journey in Northern Persia in 1881-2, translated from our 'Proceedings' (February 1883), with a map; the work of the Afghan Boundary Commission, by P. P. Kuhlberg, with a map; the economical and commercial importance of the Trans-Caspian region, according to official data compiled in 1887; the activity of Protestant missions in north-western parts of Asiatic Turkey, by A. M. Koliubakin; Toros Akhbar, a guide to Armenia, notes of a Traveller, by Archimandrite (now Bishop) Garegin Srvandziantz, translated by A. O. Kishmishief.—[E. D. M.]

Rosén, P. G.—Die Astronomisch-Geodätischen Arbeiten der topographischen Abtheilung des Schwedischen Generalstabes. Zweiter Band, Heft 1. Stockholm, P. A. Norstedt & Söner, 1888: 4to., pp. 81, plates.

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

WORLD.

Mason, John W.—Movable (Tropic) Diagram of the Seasons. Invented and constructed by John W. Mason. Edinburgh, 1888, printed and published by W. & A. K. Johnston, Edinburgh and London.

This is an ingenious contrivance for illustrating the cause of the change of the seasons, and the length of the day at different dates. It consists of a stout piece of millboard, in the upper part of which there is a circumpolar map drawn on transparent cloth, and this map is continued southwards, on the millboard, as far as the tropic of Capricorn. The meridian of Greenwich is drawn with a deep blue line from the north pole, passing through France, Spain, and Africa. Underneath the transparent circumpolar map the board is black, and the length of the day is shown by a movable piece of white cardboard attached to a brass sun, which moves in a slot between the limits of the tropics on the lower or southern portion of the map. Around the circumpolar map the twenty-four hours are marked (red for day and blue for night), and on moving the sun to its proper declination on the lower map, the white card will cut the circumference of the upper map at the hours of sunrise and sunset at London. As we have already said, this is an ingenious contrivance, but it must be remembered that the same thing could be shown as well, if not better, with a globe, by the use of which all such problems can best be illustrated.

EUROPE.

Bulgarie et Roumélie Orientale.—Par F. Bianconi, Ingénieur-géographe. Scale 1:1,000,000, or 13·6 geographical miles to an inch. Cartes Commerciales, Physiques, Politiques, Administratives, Routières, Ethnographiques, Minières et Agricoles, avec Notice Descriptive. 1^{re} Série, Région d'Orient, No. 5. Publiées par la Librairie Chaix, Paris, 1887. London, L. B. Tamini. Price 5s.

Euböischen Euripus.—Tiefenkarte des —, von Prof. Dr. O. Krümmel. Central scale 1:314,000, or 4·3 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1888, Taf. 20. Gotha, Justus Perthes. (*Dulau.*)

Macédoine.—(Comprenant le vilayet de Salonique, la majeure partie du vilayet de Monastir, et la partie sud du vilayet de Kossovo.) 3^e Édition, mise à jour. Par F. Bianconi. Scale 1:1,000,000, or 13·6 geographical miles to an inch. Cartes Commerciales, Physiques, Politiques, Administratives, Routières, Ethnographiques, Minières et Agricoles, avec Notice Descriptive. 1^{re} Série, Région d'Orient, No. 1. Publiées par la Librairie Chaix, Paris, 1888. London, L. B. Tamini. Price 5s.

Russland.—Stumme Physikalische Wandkarte von —. Scale 1:3,000,000, or 41·6 geographical miles to an inch. Richard Kiepert's Schul-Wand-Atlas der Länder Europa's. Fünfzehnte Lieferung. Berlin, D. Reimer, 1888: 4 Blätter. Price 6s. (*Dulau.*)

This is one of the excellent series of political and physical school maps by Dr. Richard Kiepert, now in course of publication.

ORDNANCE SURVEY MAPS.

Publications issued during the month of September 1888.

1-inch—General Maps:—

ENGLAND AND WALES: New Series: Sheet No. 300. Hill shaded. 1s.

6-inch—County Maps:—

ENGLAND AND WALES: **Anglesey:** 2s S.E. and 2 N.E. on one sheet, 18 N.E., 22 N.W., N.E.; 1s. each. **Brecknockshire:** 8 S.W., 9 N.E., 10 N.E., S.E., 11 N.E., 16 N.E., 43 S.E., 47 N.E., 49 N.E., 1s. each. **Cambridgeshire:** 40 S.W.; 1s. **Cardiganshire:** 36 N.E., 46 N.E.; 1s. each.

Carmarthenshire: 7 N.E., 14 N.E., S.W., S.E., 23 N.W., S.E., 31 N.E., S.W., S.E., 45 N.E.; 12. each. **Carnarvonshire:** 20 S.W., S.E., 26 N.W., S.W., 27 N.E., S.E.; 12. each. **Cornwall:** 18 N.W., 184 S.E., 26 N.E., 27 S.W., 43 N.E., S.E., 46 S.W., 47 S.E., 48 N.E., S.W., 51 S.E., 52 N.E., 54 N.W., 61 S.E., 65 N.W., 66 S.W., 77 N.W.; 12. each. **Devonshire:** 4 N.W., 10 N.W., N.E., S.W., S.E., 14 N.E., S.W., 31 N.W., N.E., 64 S.E., 66 N.E., S.W., 127 S.E.; 12. each. **Dorsetshire:** 20 N.E., S.W., 28 N.W., S.W., S.E., 29 N.W., N.E., S.W., S.E., 47 S.W., S.E., 48 S.W., 49 S.W., 54 N.W., 54 N.E. and S.E. on one sheet; 12. each. **Herefordshire:** 5 S.E., 48 N.E., 54 N.E.; 12. each. **Lincolnshire:** 65 N.W., 75 N.E., S.E., 91 N.W., N.E., 101 N.W., 105 N.E., 106 S.E., 107 N.W., S.W., S.E., 103 N.W., S.W.; 12. each. **Merionethshire:** 19 S.E., 26 S.E., 33 S.W., 37 S.W.; 12. each. **Pembrokeshire:** 4 S.W., 8 S.E., 15 S.W., 16 N.W., S.W., 22 S.W., 23 N.E., 24 S.W., 26 N.E., 29 N.E., 36 N.W.; 12. each. **Radnorshire:** 10 S.E., 13 N.W., 23 S.W., 28 N.E., S.E., 31 N.E., 32 N.E., S.E., 35 N.E.; 12. each. **Shropshire:** 48 N.E., 50 S.W.; 12. each. **Somersetshire:** 69 S.E., 93 N.E., S.W.; 12. each. **Staffordshire:** 3 S.E., 13 N.W., 19 N.W., 25 N.W.; 12. each. **Warwickshire:** 21 S.E., containing Coventry; 12. **Wiltshire:** 42; 2s. 6d.

25-inch—Parish Maps:—

ENGLAND AND WALES: **Brecknockshire:** XIV. 9, XXIII. 4, 7, 8, 3s. each; XXIII. 9, 4s.; XXIII. 10, 3s.; XXIII. 13, 4s.; XXVII. 3, 4, 7, 8, XXVIII. 2, XXX. 9, XLII. 2, 3s. each. **Cambridgeshire:** IV. 11, 3s.; XVI. 2, 5, 4s. each; XVI. 6, XXVIII. 4, 3s. each; XXIX. 11, 4s.; XXXIX. 13, 3s.; XXXIX. 15, 4s.; XXXIX. 14, 16, 3s. each; XXXIX. 5, 6, 4s. each; XXXIV. 1, 13, 3s. each; XL. 14, 6s. 6d.; XLVII. 8, 4s.; LII. 14, 3s. **Cardiganshire:** VI. 1, 4, XVI. 6, 7, 3s. each. **Carmarthenshire:** IX. 10, XI. 9, XVIII. 9, 10, 3s. each. **Devonshire:** XII. 13, 15, 4s. each; XIX. 3, 4, 8, XX. 3, 4, 6, 7, 8, 12, XXI. 2, 5, LXV. 7, 10, 13, 14, LXXVIII. 7, 11, 15, Cf. 3, 14, CIX. 1, 2, 10, CXV. 2, 3, 13, 14, 3s. each; CXXVII. 2, 4s. **Dorsetshire:** V. 11, VI. 9, VIII. 3, 4, IX. 6 and 10 on one sheet, IX. 7, XVIII. 8, XXII. 6, 7, 9, 13, 14, 15, XXIII. 4, XXIV. 8, 9, 10, 14, XXV. 7, XXVI. 3, XXXIII. 1, 12, XXXIV. 1, 3, 3s. each; XXXIV. 6, 4s.; XXXIV. 7, 10, 14, XXXV. 1, 2, 10, 14, XLII. 1, 6, XLIII. 5, XLIV. 1, 2, 3s. each. **Herefordshire:** XXXIII. 11, 4s.; XXXIII. 12, 15, 6s. each; XXXIII. 16, 11s. 6d.; XXXVII. 2, 6, XXXIX. 3, 3s. each; XXXIX. 4, 4s.; XXXIX. 7, 8, 11, 15, XL. 10, 12, 16, XLII. 2, 5, 9, 11, XLIII. 4, 8, 9, XLIV. 2, 5, 6, 9, 10, 13, 14, 16, XLV. 4, 15, 16, XLVI. 2, 5, 6, 8, 11, 12, 13, 14, 16, XLVII. 14, L. 4, 7, 8, 12, 15, 16, LI. 1, 2, 6, 3s. each; LI. 7, 4s.; LI. 10, 11, LI. 1, 6, 3s. each. **Huntingdonshire:** XVII. 3, 4s.; XVII. 7, 9, 13, 14, XVIII. 2, 4, 5, 7, 3s. each; XVIII. 13, 5s.; XIX. 2, 3, 4s. each; XIX. 4, 5, 3s. each; XIX. 7, 4s.; XIX. 10, 13, XXI. 2, 3s. each; XXI. 4, 4s.; XXI. 11, 3s.; XXI. 12, 4s.; XXII. 4, 8s.; XXI. 15, XXII. 3, 3s. each; XXII. 8, 4s.; XXII. 9, 12, 14, 16, 3s. each; XXIII. 5, 4s.; XXV. 4, 8s. each; **Leicestershire:** XXXI. 10, 14s.; XXXV. 11, XLII. 11, 3s. each; XLII. 12, 4s.; XLII. 16, 3s. **Lincolnshire:** XXXIX. 4, 4s.; XXXIX. 7, 9, 3s. each; XXXIX. 13, 4s.; LXXIV. 2, 5, 7, 10, 12, 14, 15, 16, LXXVII. 1, 3, 7, 3s. each; LXXXII. 8, 4s.; LXXXII. 10, 12, 13, 15, 16, LXXXVII. 11, 16, XC. 1, 2, 3, 8, XXVII. 16, CXIII. 1, 2, CXXII. 12, 14, 16, CXXXI. 1, 2, 5, 6, CXXXII. 3, 3s. each; CXXXII. 4, 4s.; CXXXII. 7, 8, 11, 3s. each; CXXXII. 16, 4s.; CXXXIII. 1, 2, 3s. each; CXXXIII. 5, 10, 4s. each; CXXXIII. 13, 14, 3s. each; CXXXIV. 1, 2, 3, 4s. each; CXXXIV. 4, 3s.; CXXXIV. 5, 5s.; CXXXIV. 6, 7, 4s. each; CXXXIV. 8, 11, 3s. each; CXXXIV. 12, 16, CXXXV. 5, 7, 8, 4s. each; CXXXV. 9, 3s.; CXXXV. 10, 5s.; CXXXV. 11, 12, 13, 15, 4s. each; CXXXVI. 6, 3s.; CXXXVI. 7, 4s.; CXXXVI. 9, 6s.; CXXXVI. 10, 4s.; CXXXVI. 13, 5s.; CXXXVI. 15, 16, CXXXVIII. 3, 7, 12, CXXXIX. 9, CXL. 4, 3s. each; CXL. 1, 5, 4s. each; CXL. 6, 3s.; CXL. 11, 2, 3, 5, 9, CXLVII. 9, 4s. each; CXLVII. 14, 3s.; CXLVIII. 13, 5s.; CXLVIII. 16, 4s.; **Montgomeryshire:** XXIII. 7, 5s.; XXIII. 8, 4s. **Norfolk:** XLIII. 11, 3s.; XLIII. 12, 5s.; XLIII. 16, 4s.; LVII. 3, 7, 3s. each; LVII. 8, 4s. **Somersetshire:** VIII. 14, 5s.; XIV. 5, 14s.; XIV. 6, 9, 4s. each; XXXI. 9, XXXV. 15, 16, XXXVI. 14, 16, XLVII. 8, 11, 16, 3s. each; XLVIII. 9, 10, 4s. each; XLVIII. 11, 12, 16; LXI. 5, 13, 3s. each; LXXIX. 3, 4s.; LXXX. 1, 2, 3, 5, 6, 7, 8, 10, 11, 13, 15, 3s. each; LXXX. 16, 4s.; LXXXIII. 11, LXXXIII. 3 and 7 on one sheet, 4, 8, 11 and 12 on one sheet, LXXXVII. 3, 3s. each; LXXXVII. 4, 4s.; LXXXVII. 7, 8, 9, 10, 12, 13, 15, LXXXVIII. 12, XCI. 8, 3s. each. **Warwickshire:** IV. 11, 4s.; IV. 12, 16, IX. 2, 6, 3s. each; IX. 12, 4s.; X. 9, 10, 11, 14, XI. 11, 3s. each; XI. 12, 4s.; XI. 15, 16, 3s. each; XIV. 3, 4s.; XIV. 7, 5s.; XIV. 8, 11, 4s. each; XIV. 15, 5s.; XVI. 8, 4s.; XVI. 15, 3s.; XVII. 1, 4s.; XVII. 3, 4s.; 8, 3s. each; XVII. 13, 4s.; XXI. 1, 5, 9, 13, LIV. 10, 3s. each. **Wiltshire:** LXII. 12, 4s.; LXIII. 9, LXVIII. 4, 12, 3s. each; LXVIII. 16, 4s.; LXXV. 2, 5, 3s. each. **Worcestershire:** VI. 3, 4s.; VI. 7, 5s.; VI. 8, 11, 4s. each; VI. 15, 5s.; XXXIII. 8, 6s. 6d.

Town Plans—10-feet scale:—

ENGLAND AND WALES: Cambridge, XLVII. 2, 12, 8s. The town of Cambridge is now complete in 60 sheets. Carmarthen, XXXIX. 8, 21, 22; XXXIX. 6, 5, 9, 13; XXXIX. 7, 1, 7; 2s. 6d. each. Poole, XLIII. 12, 25; XLIII. 16, 5, 8, 9, 10, 13, 14, 15, 18, 19, 20; XLIV. 9, 21; XLIV. 13, 1, 6; 2s. 6d. each. Taunton, LXX. 11, 20; LXX. 12, 6, 13, 16; LXX. 15, 10, 15; LXX. 16, 1, 4, 6, 7, 8, 9, 11; 2s. 6d. each. Wellington, LXXVIII. 4, 11, 12, 23, 24; 2s. 6d.

Miscellaneous Maps:—

Sanitary District Diagrams for the following Counties are now ready, price 6d. each: Berkshire, Derbyshire, Essex, Kent, Lancashire, Westmoreland, Yorkshire East Riding, Yorkshire West Riding, Yorkshire North Riding. With these the Sanitary District Diagrams for England and Wales are complete.

Publications issued during the month of October 1882.

1-inch—General Maps:—

ENGLAND AND WALES: New Series: Sheet No. 305, with hills, 1s. **IRELAND:** 153, with hills, 1s.

6-inch—County Maps:—

ENGLAND AND WALES: **Anglesey:** 8 N.W., 9 S.E. and 15 N.E., 14 N.W., N.E., S.W., S.E., 17 N.W., S.W., 19 S.W., 21 N.E., S.E., 23 S.W., 23 N.W., S.W., 24 N.E., 25 N.W.; 12. each. **Brecknockshire:** 1 S.E., 5 S.W., 8 S.E.; 12. each. **Cambridgeshire:** 47 N.W.; 1s. **Carmarthenshire:** 23 N.E., S.W., 30 N.W., N.E., S.W., 37 N.W., 43 S.W., 44 S.W., S.E., 45 N.W., S.W., S.E., 52 S.W., 66 N.E.; 12. each. **Carnarvonshire:** 3 N.E., S.E., 6 S.W., 11 N.W., S.W., 15 N.W., S.W., S.E., 20 N.W., 24 S.W., 25 N.E., 26 S.E., 27 N.W., S.W., 28 N.W., 29 N.E., S.E., 30 N.W., S.W., 31 N.E., S.W., S.E., 32 N.W., N.E., S.W., S.E., 33 N.W., S.W., S.E., 34 N.E., S.W., 36 N.W., 40 N.E., 41 N.E., 42 N.W., 44 N.E.; 12. each. **Cornwall:** 20 S.E., 25 N.W., 33 S.E., 34 S.W., 35 N.W.,

S.W., S.E., 40 S.E., 45 S.W., 47 N.E. and 48 N.W., 50 N.W., S.E., 51 N.E., 52 N.W.; 1s. each.
Devonshire: 1 S.E., 3 N.W. and N.E., S.W., 4 S.W., 5 S.W., S.E., 6 N.W., N.E., S.W., 7 N.E., S.W., 8 S.W., 11 N.W., S.W., S.E., 14 N.W., S.E., 35 S.E., 36 N.W., 46 N.W., S.E., 47 S.W., 55 N.W., S.E., 66 S.W., 67 N.E., S.W., S.E., 68 N.W.; 1s. each. **Dorsetshire:** 18 S.W., S.E., 19 S.E., 20 S.E., 27 N.E., S.E., 37 N.W., N.E., S.W., 38 N.E., S.E., 45 N.W., N.E., 51 N.W. and N.E., S.W., 52 N.E., 55 N.W., 57 N.W.; 1s. each. **Lincolnshire:** 22 N.E., 48 N.W., S.E., 49 N.W., 49 S.E., and 49A S.W., 66 N.E., 65 N.E., S.W., 63 N.W., S.W., S.E., 84 S.W., S.E., 91 S.W., S.E., 92 N.W., N.E., 101 N.E., 107 N.E., 108 N.E., 109 N.W., N.E., 110 S.W., 118 S.E.; 1s. each. **Merionethshire:** 3 N.W., 4 N.E., S.E., 11 N.W., N.E., 12 N.W., S.E., 18 N.E., S.E., 26 N.W., S.W., 31 N.E. and S.E., 32 N.E., 37 S.E.; 1s. each. **Pembrokeshire:** 4 N.W., 4A S.E., 7A S.W., 8 N.E., 9 N.W., N.E., S.W., 12 N.W., N.E., S.W., 13 N.W., S.W., 16 S.E., 19 N.E., 23 S.W., 24 N.W., N.E., S.E., 25 S.W., 29 N.W., S.W.; 1s. each. **Radnorshire:** 14 N.E., S.E., 22 S.W., 23 N.W., N.E., 27 S.E., 28 S.W., 29 N.W., 33 N.W.; 1s. each. **Shropshire:** 36 N.E., 41 N.W., N.E., S.E., 44 S.W., S.E.; 1s. each. **Somersetshire:** 35 N.W. and N.E., 91 S.E., 92 S.E., 95 N.E.; 1s. each. **Staffordshire:** 24 S.E.; 1s. each.

25-inch—Parish Maps:—

ENGLAND AND WALES: Brecknockshire: XIV. 4, 6, 16, XXVIII. 6, XXX. 1, 13, 3s. each.
Cambridgeshire: I. 16, 3s.; IV. 15, 4s.; XXXIV. 2, 3s. **Cardiganshire:** III. 14, 15, VI. 5, 7, X. 16, XI. 10, 13, XV. 15, XVI. 8, 13, 3s. each. **Carmarthenshire:** VIII. 4, 5, 6, 7, 11, 15, IX. 1, 4, 5, 6, 9, 13, 16, XVIII. 16, XXXIX. 11, XL. 5, XLVII. 2, 3s. each. **Devonshire:** XII. 14, 4s.; XXI. 6, 3s.; LXV. 3, 4s.; LXXVIII. 4, 16, CL. 4, 7, 3s. each; CL. 8, CXXI. 15, 4s. each. **Dorsetshire:** V. 15, XVIII. 1, 3, 6, XXII. 4, 5, 8, 10, 11, 12, XXIII. 2, 5, 6, 8, 10, 11, XXVI. 6, 11, 15, XXXI. 3, 5, 13, XXXII. 6, 7, 9, 10, 3s. each; XXXIV. 11, 4s.; XXXIV. 12, 15, 16, XLII. 2, 3, 4, 5, XLIII. 1, 6, XLIV. 5, 6, 3s. each. **Herefordshire:** XXXIV. 13, 4s.; XXXIX. 12, XLII. 13, XLIII. 13, 3s. each; XLIV. 11, 4s.; XLIV. 12, XLV. 3, 9, 10, 12, 13, 14, XLVI. 1, 3, 4, 9, 15, XLVII. 5, 13, L. 3, 11, 3s. each; LI. 3, 4s.; LI. 4, 5s.; LI. 5, 3s.; LI. 9, 4s.; LI. 12, 13, 14, 3s. each; LI. 15, LI. 2, 4s. each. **Huntingdonshire:** XVIII. 6, 3s.; XIX. 14, 4s.; XXI. 3, 3s.; XXII. 2, 4, 5s. each; XXV. 12, 3s. **Leicestershire:** XXV. 9, 3s.; XXXV. 16, 4s. **Lincolnshire:** LXXIV. 1, LXXXI. 1, 2, 5, 6, 7, 9, 12, 3s. each; LXXXII. 6, 4s.; LXXXII. 9, 3s.; LXXXII. 11, 4s.; XC. 4, CXXVII. 10, 12, 13, 14, CXXVIII. 13, 3s. each; CXXVIII. 14, 4s.; CXXIX. 2, 3, 7, CXXXI. 9, 10, 3s. each; CXXXII. 12, 4s.; CXXXIII. 15, CXXXIII. 6, 3s. each; CXXXIII. 9, CXXXV. 6, CXXXVI. 3, 14, 4s. each; CXXXIX. 10, 3s.; CXL. 8, 5s.; CXLVII. 10, 3s. **Merionethshire:** XXIII. 4, XLVI. 4, 7, 15, 16, 3s. each. **Montgomeryshire:** III. 16, 3s. **Norfolk:** XXXI. 16, 3s.; XLIII. 15, 4s. **Somersetshire:** XIV. 10, 14, 4s. each; XXX. 12, XLVII. 12, XLVIII. 16, LVIII. 3, 7, 3s. each; LXL. 2, 7, 4s. each; LXI. 9, 10, 11, 3s. each; LXI. 15, LXIX. 3, 4s. each; LXIX. 5, 6, 11, LXX. 1, 9, 3s. each; LXX. 14, 4s.; LXXI. 6, 5s.; LXXII. 11, LXXIX. 7, 4s. each; LXXIX. 16, LXXX. 9, 3s. each; LXXXVII. 16, 4s.; XCL. 1, 3, 3s. each. **Warwickshire:** X. 12, XI. 5, 4s. each; XVI. 3, XXI. 2, 10, XL. 4, 3s. each. **Wiltshire:** LXVIII. 3, 3s. **Worcestershire:** XXXIII. 4, 6s. 6d.

Town Plans—10-foot scale:—

ENGLAND AND WALES: Birmingham, XIII. 8, 7, 8, 12, 15, 16, 17, 21, 22, 24. Carmarthen, XXXIX. 2, 25; XXXIX. 6, 4, 8, 12, 15; XXXIX. 7, 11. Taunton, LXX. 12, 21; LXX. 15, 4, 5; LXX. 16, 3, 12. Wellington (Somerset), LXXVIII. 4, 6; LXXVIII. 8, 1, 6, 7, 13, 14.

Notice.—On and after September 18th, 1888, by order of H.M. Stationery Office, the price of all Town Plan sheets, plain or ruled, was raised from 2s. to 2s. 6d.

(Stanford, Agent.)

AFRICA.

Alger.—Plan d' —. Agha-Mustapha. Publié par Adolphe Jourdan, Libraire-Éditeur. Alger, 1889. Scale 416·5 feet to 1 inch. Price 7s. (*Dulaup.*)

Egypt.—Map of the Raian Basin. By Cope Whitehouse, M.A. Scale 1 : 100,000 or 1·3 geographical miles to an inch.

This map of the Raian basin, which has been compiled by Mr. Cope Whitehouse from various sources, chief among which are the surveys of officers of the Royal Engineers, is intended to illustrate the feasibility of a project of which he has for some time past been a warm and able advocate, viz. the impounding a part of the surplus water of the inundation of the Nile to be used during the low Nile period. The Raian basin which Mr. Cope Whitehouse proposes to utilise as a great reservoir, has an area of depression below high Nile, as shown in his map, of 686,000,000 square metres, and is capable of containing 20,559,640 cubic metres. With the exception of two narrow passes communicating with the Fayoum, the whole of this depression is bounded by horizontal plateaux. To the south-east the basin communicates with the Wadi Muallah and a small depression called Wadi Lulu to the east, the former, though not shown in this map, will be found in that which accompanied Mr. Whitehouse's paper in the October number of the 'Proceedings,' 1887. A glance at the map will show the importance of these depressions to Mr. Whitehouse's project, as they might be utilised to relieve the Nile during flood, and to store water for use from April to July.

In the map, levels and contours are given, but in order to understand its importance it will be necessary to study the papers on the subject which Mr. Cope Whitehouse read before the British Association in 1887 and 1888.

Égypte.—Par F. Bianconi et J. Schutz. Scale 1:3,000,000 or 41·6 geographical miles to an inch. Cartes Commerciales, Physiques, Politiques, Administratives, Routières, Ethnographiques, Minières et Agricoles, avec Notice Descriptive. 4^{me} Série, Afrique, No. 1. Publiées par la Librairie Chaix, 1887. London, L. B. Tamini. Price 5s.

Matabili, Mashona, and Bamangwato Countries, within the British Sphere of Influence; showing the territories of Khama and Lobengula, and the goldfields between the Limpopo and Zambezi Rivers. By George Cawston, Esq. Scale 1:1,000,000 or 13·6 geographical miles to an inch. London, E. Stanford, 1888.

This is a clearly drawn map, on which the routes of travellers are laid down, and the heights of many positions are given in figures, but there is no hill shading. The boundaries in this region of the lately extended sphere of British influence are also shown.

AMERICA.

British Honduras.—Map of —, by Alfred Usher. Compiled from Surveys by J. H. Faber, E. L. Rhys, E. P. Usher, R. Hume, and others. The Coast Line from the Admiralty Charts. Scale 1:385,000 or 5·3 geographical miles to an inch. F. S. Weller, London, revised edition, 1888.

In this map, which has been compiled from the latest materials, the extent of Crown lands, and of those claimed by the Belize and Produce Company, are indicated, and the approximate position of the roads laid down. Some notes with reference to the meteorology, population, imports, and exports of British Honduras are given, as well as some remarks on the condition of the bars of the rivers.

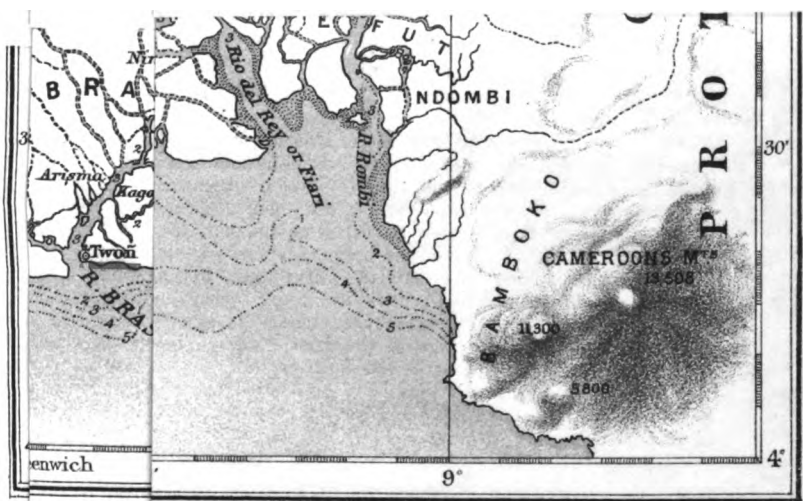
In connection with the scale of miles, Mr. Usher states that 68·8 statute miles equal a degree of the equator. This is, however, a mistake, and should be 69·16.

Venezuela.—Der See von Tacarigua und die Eisenbahn von Valencia nach Puerto-Cabello. Von E. von Hesse-Wartegg. Scale 1:420,000 or 5·9 geographical miles to an inch. {Petermann's 'Geographische Mittheilungen,' Jahrgang 1888, Tafel 19. Gotha, Justus Perthes, 1888. (*Dulau.*)

AUSTRALASIA.

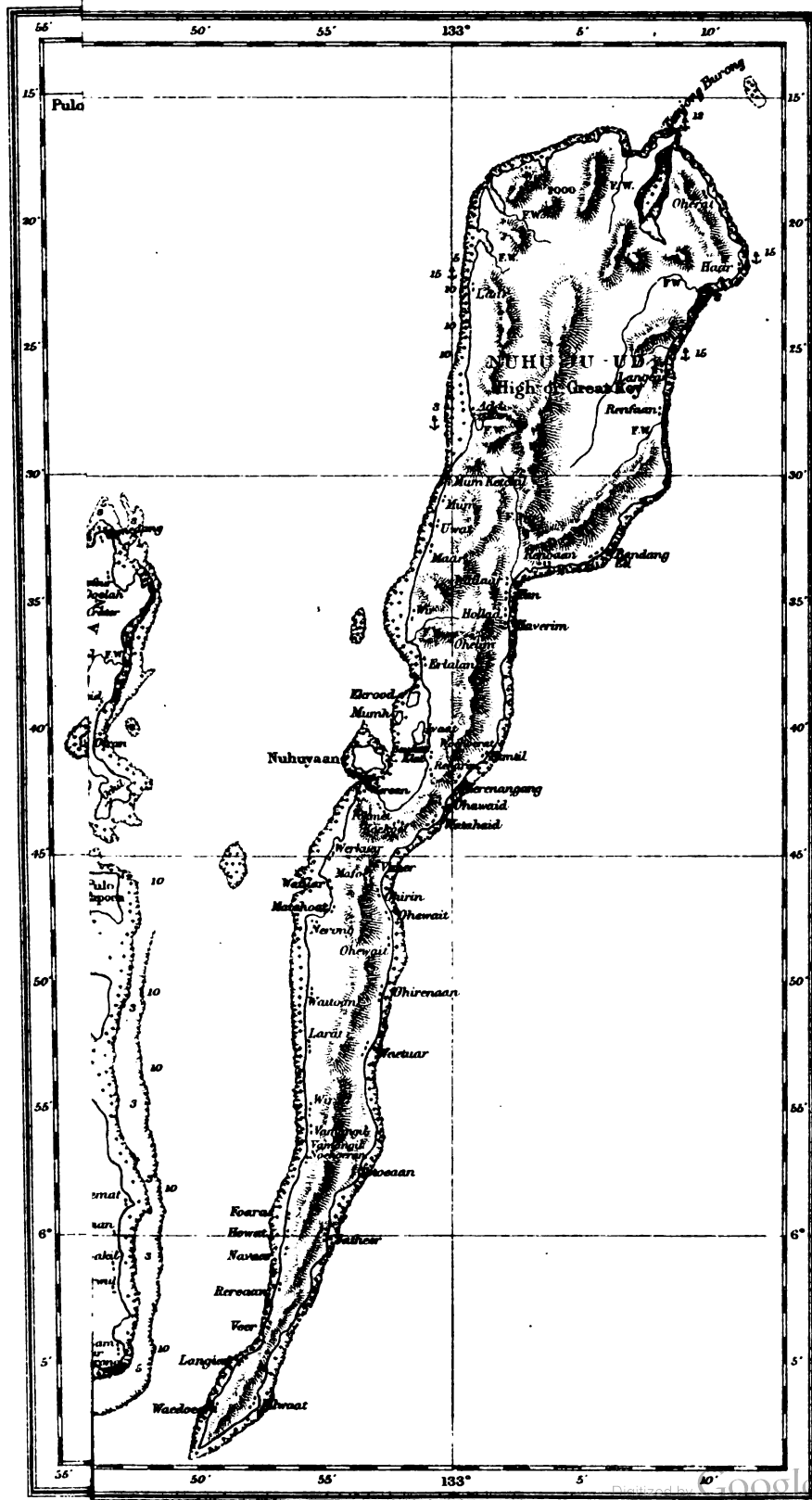
Borneo.—A Map of British North —. Compiled from the English Admiralty Charts, and from the surveys and explorations of Messrs. F. X. Wittl, W. B. Pryer, F. Hatton, Henry Walker and D. D. Daly, in the service of the British North Borneo Company. Scale 1:640,000 or 8·6 geographical miles to an inch. Published by E. Stanford, London, for the British North Borneo Company. 1888. Price 2s. 6d. in sheets.

On comparing this map with one of British North Borneo, published in the 'Proceedings,' January 1888, several additions and alterations will be found. An entirely new arrangement of the Provinces has been made. Alcock Province has been much reduced, and a new one, named Dewhurst, created. Dent Province has also been treated in the same manner, the southern half being now named Cunliffe. What has been previously known as the East Coast Residency is divided into Martin, Myburgh, Mayne, and Elphinstone Provinces, and the Segamah river has been traced and mapped as far as Mount Tribulation in Elphinstone Province. The map is divided into two minute squares, and soundings off the coast are given to the depth of twenty fathoms. In several places large red figures appear, but there is no explanation as to their meaning, and if they have no significance for the public, it would have been better to have left them out, as they do not improve the appearance of the map.



the Proceedings

F.S. Weiler, F.R.G.S., lith., Red Lion Square.



INDEX.

A.

- ABBADIE, M. D', on Mount Woso or Wocho, in Abyssinia, 389
 Aberdare Mountains, Central Africa, 724
 Abissinia, Carta della guerra in (New Maps), 186
 ——— e Le Colonie Italiane sul Mar Rosso, by Prof. F. Fasolo (New Publications), 476
 Abney, Captain, and C. D. Cunningham, The Pioneers of the Alps (New Publications), 46
 Abyssinia, Correspondence respecting Mr. Portal's Mission to (New Publications), 540
 Accra district, Gold Coast, rainfall and temperature in the, 533
 Adai Ochoch, height of, Caucasus Mountains, 688
 Adams, A., Travels of a Naturalist in Japan and Manchuria (New Publications), 320
 Address, Annual, on the Progress of Geography, 1887-8, by General Strachey, 405 *et seq.*
 Aden, Gulf of, meteorology of the, 705, 706
 Adish Glacier, 339, *note*, 342, 780, 781
 Admiralty Surveys, summary of, 417
 Adyl Pass, Caucasus Mountains, 691
 Adyr Pass, Caucasus Mountains, 691
 Aequatorialgrenze des Schneefalls, Die, von Dr. H. Fischer (New Publications), 607
 Afghanistan, Esquisse géographique de l', by F. Van Ortoy (New Publications), 395
 ——— Northorn, or Letters from the Afghan Commission, by Major C. E. Yate (New Publications), 474
 Afion Kara Hissar, latitude of, 162, 163
 Africa, Austral, Losing it or Ruling it, by John Mackenzie (New Publications), 50
 ——— Central, The Arabs in, and at Lake Nyassa, by J. Stevenson (New Publications), 740
 ——— The Commercial Future of, by Sir Francis de Winton, 722 *et seq.*
 ——— East, Count Teleki's journey in, 533
 ——— Further Correspondence relating to Zanzibar (New Publications), 540
 No. XII.—Dec. 1888.]

- Africa, South, Correspondence relating to the High Commissionership in, and its separation from the Governorship of the Cape (New Publications), 740
 ——— Further Correspondence respecting the Affairs of Pondoland (C. 5410) (New Publications), 603
 ——— History of, 1486-1691, by George McCall Theal (New Publications), 396
 ——— Inewadi Yami; or, Twenty Years' Personal Experience in, by J. W. Matthews (New Publications), 476
 ——— The Gold Fields Revisited; being Further Glimpses of the Gold Fields of, by E. P. Mathers (New Publications), 315
 ——— Papers relating to King Ja Ja of Opobo, and to the opening of West African Markets to British Trade (New Publications), 540
 ——— summary of progress of explorations in, 412
 ——— the development of, 663, 664
 ——— the mean elevation of, above sea-level, Herr Heiderich on, 589
 ——— Tropical, by Henry Drummond (New Publications), 475
 ——— West, Père Lecomte's explorations of the Portuguese possessions in, 248
 ———, vegetation and forest-scenery of, 751
 ——— West-Central, on the Influence of Arab Traders in, by Lieut. Wissmann, 525 *et seq.*
 ——— Western, The Bantu Borderland in, by H. H. Johnston, 633 *et seq.*
 African Entanglements, On Some, by Horace Waller (New Publications), 603
 ——— cartography, Baron Nordenskiöld on, 589
 ——— Company, Imperial British East, 708, 722, 723
 ——— Republic, South (New Publications), 476
 Afrika, Deutsche Arbeit in, by Hermann Soyaux (New Publications), 177
 ——— Süd, Geologische Skizze von, von Dr. Schenck (New Maps), 612
 Afrikaforschung 1788-1888, Die Fortschritte der, von A. Supan (New Maps), 482

- Afrikanische Tropen-Insel, Eine, Fernando Póo und die Bube, by Dr. Oscar Baumann (New Publications), 396
- Afrique, Le Partage Politique de l', d'après les Transactions Internationales les plus récentes, 1885-88, par Émile Banning (New Publications), 740
- La Carte d' (New Maps), 746
- dressé et dessiné par le Chef de Bon du Génie Régnault de Lannoy de Bissy (New Maps), 546
- Occidentale, L', La Nature et l'Homme Noir, by Dr. Paul Barret (New Publications), 177
- Septentrionale (Berberie), Histoire de l', depuis les Temps les plus reculés, jusqu'à la Conquête Française (1830), by Ernest Mercier (New Publications), 603
- Agassiz, Alexander, A Contribution to American Thalassography (New Publications), 477
- Aghil Dawan Mount, height of, 507
- Ainsworth, W. F., A Personal Narrative of the Euphrates Expedition (New Publications), 803
- A—k, Pandit, map of South-eastern Tibet, 579, 580
- Akha or Tiki-tiki tribe, 391
- Aksai defile, Russian Turkistan, 644
- Ak Serai, latitude of, 163
- Ak Sheher, latitude of, 163
- Ak-Shijrak group of glaciers, Thian Shan, 599
- Akpayafé river, West Africa, 635
- Akuna-kuna, West Africa, 756
- Alaska, Glaciers of, 781, *note*
- Alaska, Report of an Expedition to the Copper, Tananá, and Kóyokuk Rivers in, under direction of General Miles, by Lieut. H. Allen (New Publications), 396
- Alcock, Sir Rutherford, remarks on Explorations in British North Borneo, 22
- remarks on a Summary of Explorations in North Borneo, 145
- remarks on the Exploration and Survey of the Little Andamans, 575, 576
- Aldrich, Captain, Visit to Christmas Island, 616 *et seq.*
- Alert, H.M.S., voyage to Hudson's Bay, 559, 560
- Aletsch Glacier, Caucasus, 686
- Alger, Plan d' (New Maps), 811
- Algeria, Sir Lambert Playfair's information and population of, 166
- report on the commerce of, 305
- Algerian Sahara, M. T. de Bort's journey through the, 648
- Algérie et la Tunisie, L', by P. Leroy Beaulieu (New Publications), 474
- Oran et l', en 1887. Notices Historiques, Scientifiques et Economiques, edited by Dr. G. Seguy (New Publications), 671
- Algermissen, J. L., Spezialkarte des Schwarzwaldes (New Maps), 322
- 'Alisabad village, Persia, 630 *and note*
- Allan, George, The Land of the Duallas (New Publications), 49
- Allen, C. F. R., remarks on A Journey across Central Asia, &c., 515
- Lieutenant H., Report of an Expedition to the Copper, Tananá, and Kóyokuk Rivers in Alaska, under the direction of General Miles, by (New Publications), 396
- Almaty river, Russian Turkistan, 638
- Alpen-Karte, von Chr. Michel (New Maps), 480
- Alpenvereins, Zeitschrift des Deutschen und Oesterreichischen (New Publications), 46
- Alps, The Pioneers of the, by C. D. Cunningham and Captain Abney (New Publications), 46
- Altai Mountains, 495
- Alu Island, 358
- Amazon Provinces of Peru as a Field for European Emigration, by H. Guillaume (New Publications), 178
- Amazons, Upper, M. Ordinaire's new route from Peru to the, 650
- Ambrym, island of, volcano, 354
- America, Discovery of the Name of, by Thomas De St. Bris (New Publications), 398
- Narrative and Critical History of, vols. vi. and vii. part ii., edited by Justin Winsor (New Publications), 253, 741
- North-west Coast of, Voyages of Discovery and Exploration on the, from 1539 to 1603, United States Coast and Geodetic Survey (New Publications), 742
- Pierre Margry. Découvertes et Établissements des Français dans l'Ouest et dans le Sud de l'Amérique Septentrionale (New Publications), 742
- South, M. Monnier's journey across, 471
- summary of progress of explorations in, 417
- American Geographical Society, The New, 168
- Republics, South, Commercial, Physical, &c., Maps of the, by F. Bianconi (New Maps), 747
- Thalassography, A Contribution to, by Alexander Agassiz (New Publications), 477
- Amerikas, Captain Jacobsen's Reise an der Nordwestküste, 1881-3 (New Publications), 178
- Amu-daria, N. Zubof's surveys of the, 181
- the most ancient channels of the, by A. V. Kaulbars, 182
- Ancient maps, MM. Marcel and Gaultier's reproduction of, 99
- Andaman, derivation of the name, 574
- Islands, natives of, 569

- Andamans, Little, The Exploration and Survey of the, by Maurice Portman, 567 *et seq.*
- Anden, Reisen in den Columbianischen, by Dr. A. Hettner (New Publications), 604
- Andea, Chilian, Dr. W. Bodenbender and Dr. F. Kurtz's exploration of the, 168
- von Chile und Argentinien, Reise in den, by Paul Güssfeldt (New Publications), 108
- Andree, Richard, Allgemeiner Handatlas in hundertzwanzig Kartenseiten und zwei Ergänzungskarten, nebst alphabetischem Namenverzeichnis (New Maps), 60
- Angorn, latitude of, 163
- Angra Pequena Bay, alteration of name, 39
- Ankel, Otto, Grundzüge der Landesnatur des Westjordanlandes (New Publications), 175
- Anniversary Meeting of R.G.S., May 28th, Proceedings of, 459 *et seq.*
- Anrep-Elmpt, Count, 389
- Antarctic expedition, the German, 712
- proposed, letters from John Bramston and C. G. Barrington on, 91
- Regions, Report of a committee appointed for the purpose of drawing attention to the desirability of prosecuting further research in the, presented by Sir E. Ommañney, 668
- Antelas, height of, 454
- Antlitz der Erde, Das, by Eduard Suess (New Publications), 399
- Antotto (Shoa) to Harar, M. Arthur Rimbaud's new route from, 39
- Anville, J. d', Proposition d'une Mesure de la Terre, dont il résulte une diminution considérable dans sa circonférence sur les Parallèles (New Publications), 744
- Aola river, Guadalcanar Island, 363
- Apalachian Range, rainfall of the, 284
- Appleton's American Standard Geographies. Physical Geography, prepared on a new and original plan by J. D. Quackenbos, &c. (New Publications), 398
- Atlas of the United States (New Maps), 260
- Arab Traders in West-Central Africa, On the Influence of, by Lieut. Wissmann, 525 *et seq.*
- Arabs in Central Africa and at Lake Nyassa, by James Stevenson (New Publications), 740
- Arabia Deserta, Travels in, by C. M. Doughty (New Publications), 314
- Mecca, von Dr. C. S. Hurgonje (New Publications), 736
- Arabian Desert and Sinai Peninsula, Dr. Walther on the geology of the, 394
- Arabischen Meerbusens, Tiefen-karte des, von W. Weber (New Maps), 675
- Aral Sea, A. M. Nikolsky on the fisheries of the, 180
- Archer, W. J., Report of a Journey in the District of Chiengmai, Siam (New Publications), 539
- Arctic Ocean, Captain Johannessen's discovery of an island in the, 382
- Argentina, Republica, Atlas de la, publicado por el Instituto Geográfico Argentino (New Maps), 548
- Geografía de la, by F. Latzina (New Publications), 742
- Mapa de la, y de los Países contiguos, por J. Duclout (New Maps), 482
- Argentine, République, Cartes Commerciales, &c., par F. Bianconi (New Maps), 747
- Republic, diagram of railways in the (New Maps), 258
- map of the (New Maps), 115
- Armentia, Padre, Viaje del, Navegacion del Madre de Dios. Biblioteca Boliviana de Geografía e Historia (New Publications), 741
- Arnot, F. S., Among the Garenganze in Central Africa (New Publications), 177
- Artaria's Universal-Administrativ-Karte der Oesterreich-ungarischen Armee (New Maps), 400
- Arundo glacier, 515
- Ashbee, H. S., and A. Graham, Travels in Tunisia, with a Glossary, &c. (New Publications), 107
- Ashe Inlet, Hudson's Strait, 561
- Asia, Central, A Journey across, from Manchuria and Peking to Kashmir, over the Mustagh Pass, by Lieut. F. E. Younghusband, 485 *et seq.*
- Further Correspondence respecting the affairs of, Nos. I. and II. (New Publications), 395
- Through, with a map and appendix on the Diplomacy and Delimitation of the Russian-Afghan Frontier, by Henry Lansdell (New Publications), 49
- Minor, Dr. von Luschan's journeys in, 103
- Pen and Pencil in, or Notes from the Levant, by William Cochran (New Publications), 106
- Wall Map of Ancient, by H. Kiepert (New Maps), 546
- summary of progress of explorations in, 413, 415
- Asien, Den första på verkliga iakttagelser grundade karta öfver norra, by A. E. Nordenskiöld (New Maps), 258
- Assam and Upper Burma, exploration of route between, under directions of Mr. Needham, 377
- Astronomy and Geography, relation between, 151
- Atam, West Africa, 437
- Atlantic, Indian, and Pacific Oceans, Charts showing the mean barometrical pressure over the (New Maps), 484

Atlantic Ocean, North, Pilot Chart of the, August 1888 (New Maps), 676

———— Synchronous Weather Charts of the, and adjacent continents (New Maps), 187, 676
 Atlases, New (New Maps), 60, 187, 260, 403, 483, 548, 676, 748

Audia, latitude of, 162

Australasia: A descriptive and pictorial account of the Australian and New Zealand Colonies, &c., by W. Wilkins (New Publications), 254

———— Longmans' School Geography for, by G. G. Chisholm (New Publications), 543

———— Transactions and Proceedings of the Royal Geographical Society of, Victoria Branch, part i. vol. v. (New Publications), 543

Australia, South, Digging, Squatting, and Pioneering Life in the Northern Territory of, by Mrs. D. Daly (New Publications), 52

———— The Far North Country, by S. Newland (New Publications), 543

Australian continent, Mr. Lindsay's second journey across the, 711

———— expedition to New Guinea, 415, 416

———— Exploration from 1788 to 1888, The History of, by Ernest Favenc (New Publications), 743

———— Handbook, Shippers' and Importers' Directory and Business Guide for 1888 (New Publications), 179

———— Race, The, its Origin, Languages, &c., by E. M. Curr (New Publications), 254

Australien, Neue Karte von, von Prof. F. Behr (New Maps), 482

Autriche-Hongrie, Notice sur les Cartes Topographiques de l'État-Major Général d', by C. D. Carusso (New Publications), 105

Aveiro, Plano Hydrographico da Barra e Porto do Rio de (New Maps), 748

Aymoré Indians, Brazil, 82

Azof, Sea of, M. Kuznetzof on the waters of the, 596

B.

BACK, SIR GEORGE, voyage to Hudson's Bay, 555

Baedeker, K., Handbook for Travellers. Belgium and Holland (New Publications), 735

Baffin Land, Die Eisverhältnisse des Südöstlichen Teiles von, von Dr. F. Boas (New Maps), 745

———— William, voyage to Hudson's Bay, 552

Bagna Pesih tribe and town, Central Africa, 526, 528

Bahamas, The Land of the Pink Pearl, or Recollections of Life in the, by L. D. Powles (New Publications), 478

Baker, Mr., on the Trade of Vera Cruz 384

Bakombe tribe, 301

Bakundu tribe, West Africa, 634

Balance Sheet of R.G.S. for 1887, 461

Balfour, T. B., Botany of Socotra (New Publications), 540

Balkash, Lake, M. Nicolsky's researches in the basin of, 596

Balombo tribe and language, 37

Baltic Sea, Professor Möbius on the zoological and physical conditions of the, 173

Baltoro Glacier, 512

Baluba tribe, Central Africa, 531

Baluchistan, summary of surveys in, 422

Bambuk district, recent surveys in, 379

Banbury, G. A. L., Sierra Leone; or the White Man's Grave (New Publications), 540

Bandiagara, 165

Bangaso river, 302

Bangay Island, North Borneo, 142

Banning, Emile, Le Partage Politique de l'Afrique d'après les Transactions Internationales les plus récentes, 1885-88 (New Publications), 740

Bantu tribes, distribution of, 635, 637

———— Borderland in Western Africa, The, by H. H. Johnston, 633 *et seq.*

Barbados, An Account of a West Indian Sanatorium, and a Guide to, by Rev. J. H. Sutton Moxly (New Publications), 178

———— Island of, Meteorological Observations in the, 593

Barberton, altitude of, 439

———— geological formation of, 442

———— town of, 445

Barlow and Vaughan, Captains, voyage to Hudson's Bay, 553

Barrero, Monte, San Domingo, 239

Barret, Dr. Paul, L'Afrique Occidentale. La Nature et l'Homme Noir (New Publications), 177

Barrington, O. G., letter from, on the proposed Antarctic expedition, 92

Bartholomew, J., Handy Reference Atlas of the World (New Maps), 60

———— Elementary School Atlas (New Maps), 483

———— The Pocket Gazetteer of the World: a Dictionary of General Geography (New Publications), 607

Barttelot, Major, murder of, 646

Basardjusi, Caucasus Mountains, 678

Basil Pass, Caucasus Mountains, 692

Basque race, Comte de Charencey on the language of the, 388

Basuto Land, Unexplored, by Lieut.-Colonel Sir Marshall Clarke, 519 *et seq.*

———— progress of, as a Crown Colony, 798

Batlokoa tribe, 520

Batoka country, Dr. Holub's journey in the, 647

Batu Penutol Gorge, 14

- Batu Timbang Caves, edible bird's-nest trade at, 4
- Uko or Dog Rocks, Padas river, 18
- Baumann, Herr, expedition in Fernando Po Island, 45
- Oscar, Beiträge zur Physischen Geographie des Congo (New Publications), 50
- Beiträge zur Ethnographie des Congo (New Publications), 107
- Eine Afrikanische Tropen-Insel. Fernando Póo und die Bube (New Publications), 396
- Baumgarten, Dr. J., Deutsch-Afrika, und seine Nachbarn im Schwarzen Erdteil (New Publications), 540
- Bayer, A., Carte du Chemin de Fer Bulgare de Tzaribrod-Sophia-Vakarel (New Maps), 673
- Bayern, Topographischer Atlas des Königreich (New Maps), 183
- Beaulieu, P. Leroy, L'Algérie et la Tunisie (New Publications), 474
- Bechuanaland and the Land of Ophir, by Rev. J. Mackenzie, 725 *et seq.*
- Further Correspondence respecting the Affairs of (New Publications), 541
- Bedouin tribe, Mesopotamia, 393
- Beeston, Captain, explorations in North Borneo, 142, 143
- Behr, Prof. F., Neue Karte von Australien (New Maps), 482
- Belikan or Nagas river, North Borneo, 457
- Bell, Dr., on the depth of Hudson's Bay, 550
- Belowti or Kara-Kara Pass, 500
- Benguella and Mossamedes, E. W. Parson's report on, 448
- Benin river, West Africa, 762
- Benko, Jerolini, Reise S. M. Schiffes "Zrinyi," über Malta, Tanger, und Teneriffe nach Westindien in 1885 und 1886 (New Publications), 179
- Bennett, C. W., on the condition of trade in the Provinces of Rio Grande do Sul and São Paulo, Brazil, 383
- Berghaus' Physikalischer Atlas (New Maps), 3, 187, 403, 612
- Berlin Geographical Society, Proceedings of, December 3rd, 1887, 45
- January 7th, 1888, 103
- February 4th, 1888, 173
- March 3rd, 1888, 248
- April 21st, 1888, 390
- May 5th, 1888, 391
- June 2nd, 1888, 598
- July 7th, 1888, 600
- Nov. 3rd, 1888, 801
- Berlioux, E. F., Les Chétas sont des Scythai (New Publications), 743
- Bernard-Myo Sanitarium, Burma, 264
- Bernegg, Hektor S. von, Die Verteilung der bodenständigen Bevölkerung im Rheinischen Deutschland im 1820 (New Publications), 394
- Bernoville, Raphael, La Souanétie Libre (New Publications), 320
- Betsho, Suanetia, 339
- Pass, Caucasus Mountains, 691
- Beundo river, West Africa, 447
- Bevan, T., Fifth Expedition to British New Guinea (New Publications), 606
- journeys in New Guinea, 416
- Bezingi Glacier, Caucasus Mountains, 680, *note*
- Bhutan, R. N. and P. A.'s exploration of, 420
- Bianconi, F., Commercial, Physical, &c., Maps of the South American Republics (New Maps), 747
- Bieberstein, Baron de, on the progress of the Trans-Caspian Railway, 388
- on the Trans-Siberian Railway, 246
- Bildung der Durchbruchthäler, Die, von Prof. A. Penck (New Publications), 608
- Binahi, North Borneo, 14
- Binder, Henry, Au Kurdistan en Mésopotamie et en Perse (New Publications), 395
- journey in Kurdistan, 101, 173
- Biography, Dictionary of National, by L. Stephen (New Publications), 609
- Birds' Nest or Elephant Islands, Commander A. Carpenter's account of, 303
- Bjarnarfjord Glacier, Iceland, 307
- Blackburn, Rev. J., and Bishop Parker's journey from Mombasa to Mamboia, 92
- Black, A. C., General Atlas of the World (New Maps), 260
- C. B., Itinerary through Corsica by its Rail, Carriage, and Forest Roads (New Publications), 175
- Blackie, W. G., Commercial Education (New Publications), 318
- Blanchet, M. L., on the navigable routes in Cochín China, 596, 597
- Blanford, H. F., investigations on the Influence of Forests on Rainfall, 40, 98
- Report on the Meteorology of India in 1885 (New Publications), 48
- Blitong, Herinneringen aan, Historisch, &c., by C. De Groot (New Publications), 176
- Bloch and Ryder, Lieuts., recent journeys in Greenland, 238
- Blondel, M., on the Island of Réunion, 389
- Blyden, Edward W., Christianity, Islam, and the Negro Race (New Publications), 50
- Bodenbender, Dr. W., and Dr. F. Kurtz's exploration of the Chilean Andes, 168
- Böhmen, Fischerei-Karte des Königreich (New Maps), 183
- Neueste Eisenbahn und Strassenkarte von, von J. E. Wagner (New Maps), 673
- Neueste Handkarte von, mit der politischen Eintheilung (New Maps), 673
- Bokemeyer, Dr. H., Die Molukken (New Publications), 539
- Bokokimbo river, Guadalcanar Island, 362

- Boko-Songo, Africa, position of, 596
 Bolatli, latitude of, 162
 Bolivie, République de, Carte Commerciale, &c., by F. Bianconi (New Maps), 747
 Boliviana, Biblioteca de Geografia e Historia. I. Navegacion del Madre de Dios, Viaje del Padre Armentia (New Publications), 741
 Bondu country, survey by MM. Fortin and Leforte, 379
 Bonenschen, Dr. A., Untersuchungen über Johann de Mandeville und die Quellen seiner Reisebeschreibung (New Publications), 543
 Bonnetain, Paul, L'Extrême Orient (New Publications), 395
 Bonny, West Africa, 759, 761
 Bouvalot, Capus, and Pepin, MM., reception of, by Paris Geographical Society, 171
 Bordier, M., on the action of glaciers, 788, *note*
 Borelli, M. Jules, explorations in the Galla country, 451
 Borneo, British North, explorations in, by D. D. Daly, 1 *et seq.*
 ———, Mr. Pryer's report on the Trade in the Territory of, 797
 ———, Map of, (New Maps), 812
 ———, Summary of Explorations in, by Admiral R. C. Mayne, 134 *et seq.*
 ———, North-eastern, letter from B. T. Kindersley on the Dutch boundary line in, 594
 ———, letter from W. F. Versteeg on the Dutch boundary line in, 455, 798
 Borsari, F., La letteratura degl' indigeni Americani (New Publications), 741
 ———, Una pagina di storia Argentina (New Publications), 542
 Bort, M. T. de, journey through the Algerian Saham, 648
 Bosch Veld Mountain, Transvaal, 250
 Bosnien und der Hercegovina, Cultur und Landschaftsbilder aus, by Dr. Moriz Hoernes (New Publications), 250
 Bossi, B., La Causa principale dei Terremoti e di altre perturbazioni della natura (New Publications), 110
 Botocudo Indians, Brazil, 63, 71, 72, 80
 Botoque or lip-ornament of the Botocudo Indians, 73, 80, 81
 Bougainville Island natives, 371
 Bourgade, Dr. De, and Captain Sandalio Sosa's journey through Paraguay, 167
 Bourne, F. S. A., Report on a Journey in South-western China (New Publications), 539
 ———, Mr., on the project for a railway between South-west China and British Burma, 381
 Boyde, H., Several Voyages to Barbary (New Publications), 320
 Brahmaputra river, discharge of, 582
 Bramston, John, letter from, on the proposed Antarctic Expedition, 91
 Brazil, An Exploration of the Rio Dôce and its Tributaries in, by W. J. Stearns, 61 *et seq.*
 ———, Central, Dr. Karl von den Steinen on the primitive tribes in, 593
 ———, Condition of Trade in the Provinces of Rio Grande do Sul and São Paulo in, C. W. Bennett on, 383
 Brazza, M. Giacomo de, death of, 388
 Brettes, M. de, progress of journey in South America, 101
 Briggs, Sir T. G., Obituary of, 422
 Bright, Sir Charles Tilston, Obituary of, 387
 British Association, Proceedings of the Geographical Section of the, Bath, 1888, 654 *et seq.*, 717 *et seq.*
 ———, Columbia, Map of a portion of the Southern Interior of, embodying explorations of G. M. Dawson and A. Bowman (New Maps), 258
 ———, recent surveys in the northern interior of, 382
 ———, East African Company, The Imperial, 708, 722, 723
 ———, Honduras, Map of, by A. Usher (New Maps), 812
 ———, Isles, An Elementary Geography of the, by Archibald Geikie (New Publications), 394
 ———, The Building of the, a Study in Geographical Evolution, by A. J. Jukes-Browne (New Publications), 735
 ———, New Guinea, discovery of St. Joseph river in, 33
 ———, Theodore Bevan's Fifth Expedition to (New Publications), 606
 ———, North Borneo, explorations in, by D. D. Daly, 1 *et seq.*
 ———, Map of (New Maps), 812
 ———, Mr. Pryer's Report on the Trade in the Territory of, 797
 ———, Summary of Explorations in, by Admiral R. C. Mayne 134 *et seq.*
 Brodrick, Hon. G. C., remarks on an exploration of the Rio Dôce and its northern tributaries, 79, 84
 Brough, B. H., Tacheometry, or Rapid Surveying (New Publications), 543
 Brown, J. A., Palæolithic Man in North-west Middlesex (New Publications), 165
 ———, Obituary of Robert H. W. Dunlop by, 244
 ———, Robert, Our Earth and its Story: a Popular Treatise on Physical Geography, edited by (New Publications), 318
 Browne, Major E. C., The Coming of the Great Queen, a Narrative of the Acquisition of Burma (New Publications), 251
 Bryce, J., remarks on Suanetia, 350
 ———, J. Annan, remarks on Siam, 131

- Bryce, J. Annan, remarks on the Ruby Mines near Mogok, Burma, 274
- Bube tribe, Fernando Po, 46
- Büchner, E., Zur Geschichte der Kaukasischen Ture (New Publications), 176
- Buchta, Richard, Der Sudan unter Agyptischer Herrschaft (New Publications), 177
- Buldur, latitude of, 162
- Bulgaria. Carte du Chemin de Fer Bulgare de Tzaribrod-Sophia-Vakarel, par A. Bayer (New Maps), 673
- Past and Present, by James Samuelson (New Publications), 251
- Bulgarie et Roumélie Orientale, par F. Bianconi (New Maps), 809
- Bulladan, latitude of, 162, 163
- Bumila Creek, Little Andaman, 571
- Bunge, A. A., Expedition to the New Siberian Islands, 180
- Burma and China, Report on the Railway Connection between, by A. R. Colquhoun and H. S. Hallett (New Publications), 48
- British, and South-west China, project for a railway between, Mr. Bourne on the, 381
- China Railway Connections a Pressing Necessity (New Publications), 737
- Major Hobday's Report on Survey Work in, 1887-8, 452
- Map of, W. and A. K. Johnston (New Maps), 482
- murder of Mr. G. H. Powell in, 591
- On the Ruby Mines near Mogok, by Robert Gordon, 261 *et seq.*
- The Coming of the Great Queen, a Narrative of the Acquisition of, by Major E. C. Browne (New Publications), 251
- Upper, and Assam, exploration of route between, under directions of Mr. Needham, 377
- rainfall of, 272
- summary of surveys in, 421
- Burton, Richard F., his Early, Private, and Public Life, by Francis Hitchmann (New Publications), 111
- Bushmen of South Africa, 523
- Bussorah, improvement in the trade and climate of, 452
- Button, Sir Thomas, voyage to Hudson's Bay, 552

C.

- CAILLAUD, M. DU, on the Saint Joseph river, 389
- California, Ocean Currents contiguous to the coast of, by Dr. C. M. Richter (New Publications), 51
- of the South, by Walter Lindley and J. P. Widney (New Publications), 397
- Southern, Large-scale Sectional Map of (New Maps), 186
- State Mining Bureau, Seventh Annual Report of the State Mineralogist (New Publications), 478

- Cambridge, Dr. Guillemard appointed to the geographical lectureship at, 447
- University of, Lectures on Geography delivered before the, by General Strachey—
- Lecture I., 146
- " II., 205
- " III., 220
- " IV., 275
- Cameron and English, Messrs., journey up the Saint Joseph river, 389
- Cameroon Mountain and district, MM. Valdau and Knutson's exploration of, 380
- Cameroons District, Herr von Danckelman's Map of, 799
- Cameroons region, German surveys in the, 648
- result of Lieuts. Kund and Tappenbeck's expedition to the, 447
- Canada, Geological and Natural History Survey of, Annual Report 1886 (New Publications), 741
- Nord-Ouest, Traditions Indiennes du, by Emile Petitot (New Publications), 743
- Report of the Select Committee of the Senate appointed to inquire into the resources of the Great Mackenzie Basin (New Publications), 741
- The History of, by W. Kingsford (New Publications), 542
- Canary Islands, Dr. Verneau's explorations in the, 247
- Candelaria Reefs, Solomon Islands, 352, *note*
- Cape Colony, Map of Police Districts, 1887 (New Maps), 482
- of Good Hope, Blue-books on Native Affairs (New Publications), 107
- Capus, Bonvalot, and Pepin, MM., reception of, by Paris Geographical Society, 171
- 'Caracciolo,' Circumnavigation of the (New Publications), 52
- Carey, A. D., discussion on paper, A Journey round Chinese Turkistan and along the Northern Frontier of Tibet, by, 41
- journey in Central Asia, 413
- Caribbees, Down the Islands: a voyage to the, by W. A. Paton (New Publications), 178
- Carles, W. R., Life in Corea (New Publications), 311
- Caron and Lefort, MM., voyage on the Upper Niger, 247
- Lieut., journey to Timbuktu, 165
- reception of, by Paris Geographical Society, 390
- Carpenter, Commander A., Account of Birds' Nest or Elephant Islands, 303
- Carusso, C. D., Notice sur les Cartes Topographiques de l'Etat-Major Général d'Autriche-Hongrie (New Publications), 105
- Cassiquiari river, South America, 98

- Castillo, Lieut. A. del, Explorations on the Watershed of South Patagonia, 651
- Caucase en Trans-caspienne, Voyage au, by Edmond Cotteau (New Publications), 395
- Recherches Anthropologiques dans le, par Ernest Chantre (New Publications), 311
- Recherches Géologiques de la Chaîne du, by Ernest Favre (New Publications), 315
- Caucasus, absence of lakes in the, 698
- A. F. Mummery's visit to the, 589
- Ethnography of the, Philology, Part III. The Language of the Chechens, by Baron P. K. Usar (New Publications), 736
- ethnology of the, 702, 704, *note*
- flora of the, 695, 697
- glaciers of the, 780 *et seq.*
- group, note on the sketch map of the, 348
- peaks, nomenclature of the, 348, 349
- Section of the Imperial Russian Geographical Society, 'Proceedings' of (New Publications), 808
- The Ethnography of the, by Baron P. K. Usar (New Publications), 176
- The Ornithological Fauna of the, by Dr. Gustav Radde (New Publications), 105
- The Peaks, Passes, and Glaciers of the, by D. W. Freshfield, 677 *et seq.*
- Western, rainfall of the, 699
- Caucasian exploration, 326
- Cawston, G., Map of the Matabili, Mashona, and Bamangwato Countries (New Maps), 812
- Caxoeira de Baguary Fall, Rio Doce, 78
- Ceylon in the Jubilee Year, by John Ferguson (New Publications), 176
- work of the Hydrographic Survey in, 418
- Chaffanjon, M., journey to the head-waters of the Orinoco, 96, 100
- Chandless river, Brazil, Mr. Derby on the name of, 795
- Chagres river, Central America, 665
- Challenger, H.M.S., Report on the Scientific Results of the Voyage of, prepared under the superintendence of the late Sir C. Wyville Thomson and John Murray. Zoology, vols. xxiii.-xxvii. (New Publications), 543, 744
- Chang-peï-shan Mountains, 485
- Chantre, Ernest, Recherches Anthropologiques dans le Caucase (New Publications), 311
- M., on the Suanetian language, 335
- Chaoni, Mount, height of, 25
- Chapin, F. H., A series of 54 Photographs of mountain scenery in Colorado, taken by (New Maps), 404
- Charencey, Comte de, on the language of the Basque race, 388
- Charts, New—
- Admiralty, 59, 115, 323, 482, 547, 675
- Cancelled, 59, 116, 324, 483, 548, 676
- Corrected, 59, 116, 324, 483, 548, 676
- Danish Charts, 483
- French Hydrographic, 187, 612
- United States Hydrographic, 60, 187, 260, 324, 483, 548, 676, 748
- Chatham Islands, Map of the, from surveys by S. P. Smith and J. Robertson (New Maps), 260
- Chavannes, M., on the position of Boko-Songo, 596
- Chechens, The Language of the, Ethnography of the Caucasus. Philology, Part II., by Baron P. K. Usar (New Publications), 736
- Chelomoni ridge, 29
- Chieng Kwang, Siam, 127
- Chiengmai, district of, Siam, Report by Mr. Archer of a journey in the (New Publications), 539
- Chikala, Mount, height of, 25
- Chile und Argentinien, Reise in den Andes von, by Paul Güssfeldt (New Publications), 108
- Mr. Newman on the state of wheat culture in, 796
- Chilian Andes, Dr. F. Kurtz and Dr. W. Bodenbender's exploration of the, 168
- China, Great Wall of, 489
- South-west, and British Burma, project for a railway between, Mr. Bourne on the, 381
- South-western, Report by Mr. Bourne of a Journey in (New Publications), 539
- work of the Hydrographic Survey in, 418
- Chinese Empire, Historical Atlas of the, by E. L. Oxenham (New Maps), 403
- Chingmis tribe, Bhutan, 420
- Chippindall, Lieut. W. W., Observations taken by, on the White Nile in 1875 (New Publications), 107
- Chiragh Saldi Pass, 505
- Chirwa Island, Lake Shirwa, 30
- Chisholm, George G., Longmans' Junior School Geography (New Publications), 398
- Longmans' School Geography for Australasia (New Publications), 543
- Chiuta, Lake, 31
- Chodzko, General, survey of the Caucasus Mountains, 684, *note*
- Cholet, M., journey in West Africa, 101
- Christianity, Islam, and the Negro Race, by Edward W. Blyden (New Publications), 50
- Christmas Island, Indian Ocean, Account of, by Captain W. J. L. Wharton, 613 *et seq.*
- Chubiani, houses and towers of, Caucasus Mountains, 335

- Church, G. E., *The Venezuela Central Railway and its Sources of Traffic* (New Publications), 321
- Clarke, G. W., 491
- Lieut.-Colonel Sir Marshall, Unexplored Basuto Land, 519 *et seq.*
- Clayden, A. W., *Perspective Maps and Common Maps*, 668
- Clyde Sea Area, *The Salinity of the*, by H. R. Mill, 667
- Cobb, Mr., *Report on the Climate of the Falkland Islands*, 797
- Cochran, William, *Pen and Pencil in Asia Minor; or Notes from the Levant* (New Publications), 106
- Coddington, Colonel F., *survey work in India*, 650
- Coen, Gustavo, *Le Grande Strade del Commercio Internazionale proposte fino del Sec. XVI.* (New Publications), 179
- Coghlan, T. A., *The Wealth and Progress of New South Wales, 1886-87* (New Publications), 398
- Colin, Dr., *journey along the Upper Senegal*, 170
- Colombia, *Describeion Historica, Geografica y Politica de la Republica de* (New Publications), 51
- Colombie et Equateur, *Carte Commerciale, &c.*, by F. Bianconi (New Maps), 747
- Colonies of the United Kingdom, *The*, by A. Cooper (New Publications), 479
- Colorado, *A series of 54 Photographs of mountain scenery in*, taken by F. H. Chapin (New Maps), 404
- Colquhoun, A. R., *remarks on Siam*, 130
- and H. S. Hallett, *Report on the Railway Connection of Burma and China* (New Publications), 48
- Columbia, British, *Map of a portion of the Southern Interior of, embodying explorations of G. M. Dawson and A. Bowman* (New Maps), 258
- Columbianischen Anden, *Reisen in den*, by Dr. A. Hettner (New Publications), 604
- Congo, *Beiträge zur Physischen Geographie des*, by Oscar Baumann (New Publications), 50
- *et au Kassai, Au, par Capitaine Thys* (New Publications), 671
- M. Édouard Dupont *on the physical geography of the*, 234
- *Sur le Haut*, by Captain C. Coquilhat (New Publications), 541
- Constanza, *Valle de, San Domingo*, 240
- Cooke, G. H., *survey work in India*, 650
- Cooper, A., *The Colonies of the United Kingdom* (New Publications), 479
- Coordes, O., und K. Bamberg, *Klimatologische Wandkarte von Europa* (New Maps), 481
- Coote, C. H., *Johann Schöner, A reproduction of his Globe of 1523, &c.*, with translations and notes by Henry Stevens, edited by (New Publications), 319
- Copenhagen, *population of*, 101
- Copper, Tananá, and Kóyukuk Rivers in Alaska, *Report of an Expedition to the, under direction of General Miles*, by Lieut. H. Allen (New Publications), 396
- Coquilhat, Camille, *Sur le Haut-Congo* (New Publications), 541
- Coral Sea, *work of the Hydrographic Survey in the*, 419
- Corbin, D. F. M., *A Life of Matthew Fontaine Maury* (New Publications), 479
- Corea, *Life in*, by W. R. Carles (New Publications), 311
- Corsica, *Itinerary through, by its Rail, Carriage, and Forest Roads*, by C. B. Black (New Publications), 175
- Cosson, E., *Compendium Floræ Atlanticæ, seu Expositio methodica plantarum omnium in Algeria necnon in regno Tunetano et imperio Maroccano lucusque notarum* (New Publications), 740
- Côte d'Azur, *La*, by Stephen Liegard (New Publications), 786
- Cotteau, Edmond, *Voyage au Caucase et en Transcaspienne* (New Publications), 395
- Coudreau, M., *explorations in French Guiana*, 473
- Council of R.G.S., *Annual Report of the*, 459
- Couppé, Père, *explorations in New Guinea*, 248
- Cowan, Colonel, *survey work in India*, 650
- Cowen, Charles, *Witwatersrand, Johannesburg, and other Gold Fields* (New Publications), 396
- Crawford, Robert, *Reminiscences of Foreign Travel* (New Publications), 480
- Crocodile river, *Transvaal*, 439
- Cromer, Mr., *ascent of Mount Roraima*, 166
- Cross river, *West Africa*, 635, 756
- *A Journey up the*, by H. H. Johnston, 435 *et seq.*
- Cross, Staff-Surgeon H., *A Series of 76 Photographs of the Western Pacific Islands*, taken by (New Maps), 404
- Cubit, Persian, *length of the*, 584
- Cunningham, C. D., and Captain Abney, *The Pioneers of the Alps* (New Publications), 46
- Cunucunuma river, 101
- Curling, Rev. J. J., *remarks on a Journey in the Interior of Labrador*, 203
- Curr, E. M., *The Australian Race: its Origin, Languages, &c.* (New Publications), 254
- Curtis Island, *extent of*, 316, 317
- Cuthbertson, Mr., *expedition to New Guinea*, 416

D.

- DALLAS, W. L., *Memoir on the Winds and Monsoons of the Arabian Sea and North Indian Ocean* (New Publications), 473
- Daly, D. D., *Explorations in British North Borneo*, 1 *et seq.*

- Daly, D. D., remarks on Explorations in British North Borneo, 24
 — Mrs. Dominic, Digging, Squatting, and Pioneering Life in the Northern Territory of Southern Australia (New Publications), 52
 Danckelman, Herr von, Map of the Cameroons District, 799
 Dandi, Mount, East Africa, 451
 Danish Charts (New Maps), 483
 — Explorations in Greenland, Herr H. Rink on Recent, 238
 Danmark, Generalstabens topographiske Kaart over (New Maps), 745
 Danvers, F. C., Bengal: its Chiefs, Agents, and Governors (New Publications), 737
 D'Anville's map of South-eastern Tibet, 579
 Darwin, Francis, The Life and Letters of Charles Darwin, including an Autobiographical Chapter (New Publications), 53
 Dashwood, General, remarks on A Journey in the Interior of Labrador, 204
 — letter from, on the resources of Newfoundland, 652
 Daubrée, A., Les Eaux Souterraines aux Époques Anciennes; Rôle qui leur revient dans l'Origine, &c. (New Publications), 544
 — Les Eaux Souterraines à l'époque actuelle, leur régime, &c. (New Publications), 544
 Davázdah Imám village, 629, *note*
 Davis, John, early visit to Hudson's Strait, 550
 — 'J. D., Contributions towards a Bibliography of New Zealand (New Publications), 478
 Davies, Mr., explorations in North Borneo, 141, 143
 Dawson, George M., Notes and Observations on the Kwakiol People of Vancouver Island (New Publications), 478
 — exploration of the Northern Interior of British Columbia, 382
 Déchy, M. de, ascent of Caucasian peaks, 690
 Deep-sea Soundings in Connection with Submarine Telegraphy, by L. Stallibrass (New Publications), 399
 De Kaap and Komatie Gold-fields, Map of the, compiled by G. A. Troye (New Maps), 114
 Delalande, Lieut. G., cruise along the coast of Gulf of Guinea, 472
 Dellon, D., Relation de l'Inquisition de Goa (New Publications), 745
 Demävend, altitude of, 86
 — Notes on, by General A. Houtum-Schindler, 85 *et seq.*
 Demirjik, latitude of, 162
 Denizli, latitude of, 162, 163
 Dent, C. T., remarks on Suanetia, 350
 Derby, O., On the name of Chandless River, Brazil, 795
 Dore Keui, latitude of, 162
 Deutsch-Afrika, und seine Nachbarn im schwarzen Erdteil, by Dr. J. Baumgarten (New Publications), 540
 — Österreichisch-Russischen Grenzländer, Karte der (New Maps), 400
 Deutsche Kolonialgeschichte, by Max von Koschitzky (New Publications), 181
 — Togogebiet und meine Afrika-reise, Das, by Ernst Henrici (New Publications), 476
 Deutschland, Forschungen zur Deutschen Landes- und Volkskunde im Auftrage der Central-Commission für wissenschaftliche Landeskunde von, von Dr. R. Lehmann und Dr. A. Kirchhoff (New Publications), 668
 — Geologie von, und den angrenzenden Gebieten, von Dr. B. Lepsius (New Publications), 803
 Deutschen Reiches, Karte des (New Maps), 112, 321, 400, 673
 — Wasserstrassen, Karte der (New Maps), 183
 Develi Kara Hissar, latitude of, 163
 Dheboé, Lake, 165
 Dibong river, Upper Assam, 581, 582
 Dickson, W. J., on the population of Colombia, 168
 Digges Island, Hudson's Strait, 562
 Dihong river, discharge of, 582
 Dineir, latitude of, 162
 Dingri, town of, Tibet, 90
 Djassaktu tribe, 497
 Djiper Pass, Caucasus Mountains, 690
 Dobree, T. S., explorations in North Borneo, 134, 135
 Döe, Rio, An Exploration of the, and its Northern Tributaries (Brazil), by W. J. Steains, 61 *et seq.*
 — list of the valuable woods and the minerals and climate of the, 65, 66
 Doering, Oscar, La variabilidad interdiurna de la Temperatura en algunos puntos de la República Argentina (New Publications), 108
 Dolomites, the hypsometry of the, 454
 Domasi Mission Station, Mount Zomba, Notes of a Journey from, to Lake Namaramba, by the Rev. A. Hetherwick, 25 *et seq.*
 Donau-Panorama von Passau bis Linz (New Maps), 400
 Donetz coal-basin in South Russia, 305
 Dong Phraya Fai forest, Siam, 123
 Dongusorun Pass, Caucasus Mountains, 691
 — Peak, height of, 688
 Donkin, W. F., and H. Fox, journey in the Caucasus, 686, 687
 — and — disaster in the Caucasus, particulars of, 790
 — and — Obituary of, 715
 Doughty, C. M., Travels in Arabia Deserta (New Publications), 314
 — award of Gill Memorial to, 300, 468

- Douls, M. Camille, journey in Western Sahara, 102
- Drakensberg range, 249, 519
- Drangajökull glacier, Iceland, 307
- Drayton, M., Poly-Obion (New Publications), 609
- Dressel, F., ascent of Mount Roraima, 166
- Drummond, C. S., remarks on Hudson's Bay and Hudson's Strait as a navigable channel, 567
- Henry, Tropical Africa (New Publications), 475
- Duallas, The Land of the, by George Allan (New Publications), 49
- Duclout, J., Mapa de la Republica Argentina y de los Paises contiguos (New Maps), 482
- Duncan, Captain, voyage to Hudson's Bay, 554
- Dunlop, Robert H. W., Obituary of, 244
- Dupont, E., Conférence donné à la Société Belge des Ingénieurs et des Industriels le 29 Fév. 1888 par, sur les Résultats de l'Exploration Scientifique qu'il a faite au Congo, 1887 (New Publications), 607
- on the Physical Geography of the Congo, 234
- Dutch Boundary-line in North-eastern Borneo, letter from W. F. Versteeg on the, 455, 798
- — North-eastern Borneo, letter from B. T. Kindersley on the, 594
- East Indies. Handboek von Culturen Handelsondernemingen in Nederlandsch-Indië (New Publications), 539
- Naval Intelligence Department (New Publications), 251
- geographical discoveries, early, 210
- Dychtau Peak, height of, 688
- F.
- EARTH and its Story, Our, a Popular Treatise on Physical Geography, edited by Robert Brown (New Publications), 318
- in Space, The, by E. P. Jackson (New Publications), 255
- physical forces of the, 212 *et seq.*
- Earth-knowledge; a Text-book of Elementary Physiography, by W. J. Harrison and H. R. Wakefield (New Publications), 255
- Earth's surface, distribution of life and rainfall on the, 275 *et seq.*
- East Indies, intended expeditions to the, 246
- Eaux Souterraines, Les, by A. Daubrée (New Publications), 544
- Eberstein, Lieut., ascent of Kilimanjaro, 34, 45
- Eclectic Physical Geography, by Russell Hinman (New Publications), 671
- Edinburgh, Leith, and Portobello, New Plan of, W. and A. K. Johnston (New Maps), 545
- Edinburgh Waistcoat Pocket Map of the county of, W. and A. K. Johnston (New Maps), 545
- Efik Tribe, West Africa, 633
- Egerdir, latitude of, 162
- Egeria, visit of the, to Christmas Island, 616
- Eggers, Baron H., journey into the Highlands of San Domingo, 239
- Egypt and the Soudan, The Literature of, from the earliest times to 1885. By H.H. Prince Ibrahim-Hilmy (New Publications), 541
- Map of the Raian Basin, by Cope Whitehouse (New Maps), 811
- Egypte, Map of, by F. Bianconi and J. Schütz (New Maps), 812
- Elbruz Mount, Caucasus, 678, 688
- Elephant or Birds' Nest Islands, Commander A. Carpenter's account of, 303
- Rapid, Mobangi river, 301
- Eliot, John, Report on the Meteorology of India in 1886 (New Publications), 473
- Ellice Islands, 352, *note*
- Ellis, Sir Barrow H., Obituary of, 423
- El-Wedj, mission to, by Captain Conyers Surtees, 734
- Emin Pasha in Central Africa, being a Collection of his Letters and Journals. Edited by Dr. Schweinfurth, Prof. Ratzel, Dr. Felkin, and Dr. Hartlaub (New Publications), 252
- relief expedition, progress of, 646
- Empress Augusta river, New Guinea, 601
- — Dr. Schrader's journey up the, 241
- England, Map of, W. and A. K. Johnston (New Maps), 481
- work of the Hydrographic Survey on the shores of, 418
- English geographical discoveries, early, 210
- Enjouk Plains, Burma, 264
- Erdhälft, Wandkarte der oestlichen und westlichen, by E. Gaebler (New Maps), 55
- Eskimos of Labrador, the, 191, 193
- España, Mapa Topográfica de (New Maps), 113
- Espirito Santo, Brazil, 64
- Euboischen Euripus, Tiefenkarte des, von Prof. Dr. Krummel (New Maps), 809
- Euphrates and Tigris rivers, floods of the, 393
- Expedition, A Personal Narrative of the, by W. F. Ainsworth (New Publications), 803
- Europa, Klimatologische Wandkarte von, von C. Coordes und K. Bamberg (New Maps), 481
- Eisenbahn-Karte der oestlichen (New Maps), 400
- Euterpe oleracea, 77
- Evening Meetings, R.G.S., Report of, November 14th, 1887, 41
- November 28th, 1887, 44
- December 12th, 1887, 44

Evening Meetings, R.G.S. (*contd.*)—

- January 16th, 1888, 100
 - 30th, 1888, 169
 - February 13th, 1888, 169
 - 27th, 1888, 242
 - March 12th, 1888, 242
 - 26th, 1888, 310
 - April 23rd, 1888, 310
 - May 14th, 1888, 388
 - June 11th, 1888, 536
 - 25th, 1888, 536
 - November 12th, 1888, 800
- Eyvindara river, Iceland, 306

F.

- FALEME river, exploration of, by Captain Oberdorf, 379
- Falkland Islands, Mr. Cobb's report on the climate of the, 797
- Farsakh, Persian, On the Length of the, by General A. Houtum-Schindler, 584 *et seq.*
- Fasolo, Prof. F., L'Abissinia e le Colonie Italiane sul Mar Rosso (New Publications), 476
- Faunthorpe, Rev. J. P., remarks on the presentation of prizes to student of Training Colleges, 469
- Fauro Island, 359
- Favé, M., survey work in Madagascar, 649
- Favenc, Ernest, The History of Australian Exploration from 1788 to 1888 (New Publications), 743
- Favre, M. E., explorations in the Caucasus, 684, 685
- Recherches Géologiques de la Chaîne du Caucase (New Publications), 315
- Fayoum and Raian Basins, the River of Joseph, by Cope Whitehouse, 733
- Fea, M. Leon, journey in Terasserim, 711
- Featherstonhaugh, G. W., A Canoe Voyage up the Minnay Sotor (New Publications), 745
- Felkin, Dr., Dr. Schweinfurth, Prof. Ratzel, and Dr. Hartlaub, Emin Pasha in Central Africa, being a collection of his Letters and Journals, edited by, (New Publications), 252
- Fellach or Ansariéh tribe of Asia Minor, 104
- Ferguson, John, Ceylon in the Jubilee Year (New Publications), 176
- Fernando do Noronha, The Island of, in 1887, by Rev. T. S. Lea, 424 *et seq.*
- Fernando Po Island, Herr Baumann's exploration of, 45
- Fernando Póo und die Bube. Eine Afrikanische Tropen-Insel, by Dr. Oscar Baumann (New Publications), 396
- Fesigny, M. de, journey on the Upper Mekong, 597
- Festing, Major, award of Cuthbert-Peek Grant to, 300, 468
- Figueira settlement, Rio Dôce, 64
- Fiorini, M., Le Projezioni quantitative ed equivalenti della Cartografia (New Publications), 607
- Fischer, Dr. Hans, Die Aequatorialgrenze des Schneefalls (New Publications), 607
- Fitch, J. G., and H. E. Oakeley, Letter from, to Sir Beauchamp Walker, on Geographical Education in Training Colleges and Elementary Schools, 297
- Flower, Prof., remarks on the Exploration and Survey of the Little Andamans, 576
- Flying Fish*, visit of the, to Christmas Island, 615
- Foncin, P., Géographie Générale (New Publications), 111
- Forbes, H. O., remarks on an Account of Christmas Island, 624
- Forcados river, West Africa, 762
- Foreign Travel, Reminiscences of, by Robert Crawford (New Publications), 480
- Forest-growth on arid lands, Major Powell on, 793
- Forests, influence of, on rainfall, Mr. Blandford's and Professor Gannett's investigations on the, 40, 98
- Forsyth, Sir Douglas, Autobiography and Reminiscences of, edited by his daughter (New Publications), 318
- Foucauld, Vicomte C. de, Reconnaissance au Maroc, 1883-84 (New Publications), 670
- Foulga, latitude of, 162
- Fournel, Marc, La Tripolitaine (New Publications), 50
- Fournereau, M., expedition to Indo-China, 389
- Fowler, Sir R., remarks on Bechuanaland and the Land of Ophir, 731
- Fox, Captain Luke, voyage to Hudson's Bay, 552
- , H., and W. F. Donkin, disaster in the Caucasus, particulars of, 790
- and — Obituary of, 715
- França Leite, Dr. R. N. da, attempt to colonise the banks of the Rio Dôce, 66, 67
- France, Atlas Historique de la, par Auguste Longnon (New Maps), 260
- Carte de, et ses Colonies, dressée par Manuel (New Maps), 673
- — — (New Maps), 55, 321, 673
- Carte des Départements, gravées par E. Guillot (New Maps), 113
- French Guayana, Plan showing the principal Gold Mines in (New Maps), 323
- Guiana, M. Coudreau's explorations in, 473
- Hydrographic Charts (New Maps), 187, 612
- Sudan, recent explorations in, 378
- survey work in Madagascar, Recent, 649
- François, Captain von, progress of journey in Togo-land, 799
- Freshfield, Douglas W., Suanetia, 325 *et seq.*
- The Peaks, Passes, and Glaciers of the Caucasus, 677 *et seq.*
- Note on the Conservative Action of Glaciers, 779 *et seq.*

Frey, Colonel H., *Campagne dans le Haut Sénégal et dans le Haut Niger* (New Publications), 541
 Froude, J. A., *The English in the West Indies; or the Bow of Ulysses* (New Publications), 108
 Furuffjord Glacier, Iceland, 307

G.

- GAEBLER, Ed., *Wandkarte der oestlichen und westlichen Erdhälfte* (New Maps), 55
 Galignani's Traveller's Guide through France (New Publications), 745
 Galla country, M. Jules Borelli's exploration in the, 451
 Galton, Francis, remarks on the presentation of Prizes to Students of Training Colleges, 468
 Gannett, Prof. H., investigations on the influence of forests on rainfall, 98
 Garnak, M., exploration of the Khin-gan Mountains, 304
 Garrick, H. B. W., Report of a Tour in the Panjáb and Rājputāna in 1883-4, by, *Archæological Survey of India* (New Publications), 473
 Garsoppa Falls, height of, 310
 Gauthier, M., journey on the Upper Mekong, 597
 Gävmåsa-röd or Kara Chāi river, 626 *note*
 Gebi, village and people, Caucasus, 692
 Gebiveak and Gurdziveak Passes, Caucasus Mountains, 693
 Gebren Su valley, 160, 161
 Geiger, Dr. Wilhelm, *Die Pamir-Gebiete* (New Publications), 111, 254
 Geikie, Archibald, *An Elementary Geography of the British Isles* (New Publications), 394
 Geodätischen Instituts, Veröffentlichung des Königl. Preussischen (New Publications), 47, 480
 Geodetic Association, International, Reports of (New Publications), 807
 Geografia, Guida per l'Insegnamento della, by Luigi Hugues (New Publications), 53
 Geographical discoveries, summary of early, 206 *et seq.*
 — Education in Portugal, Professor de Mello on, 651
 — Training Colleges and Elementary Schools, Letter from Messrs. Oakeley and Fitch to Sir Beauchamp Walker on, 297
 — the Year's Progress at Oxford, Mr. Mackinder's Report on, 531
 — Lectureship at Cambridge, Dr. Guillemard appointed to the, 447
 — Publications, New—
 Africa, 49, 107, 177, 252, 315, 396, 474, 540, 603, 670, 740
 America, 51, 108, 178, 253, 315, 396, 477, 542, 604, 741
 Geographical Publications (*contd.*)—
 Arctic, 52, 110, 542
 Asia, 48, 106, 175, 251, 311, 395, 473, 539, 669, 736, 803
 Australasia, 52, 110, 179, 254, 398, 478, 542, 605, 743
 Europe, 46, 105, 175, 250, 311, 394, 473, 538, 668, 735, 803
 General, 52, 110, 179, 254, 318, 398, 479, 543, 607, 671, 743, 807
 Oceania, 316
 West Indies, 743
 — Readers, Hughes' Picturesque, by J. R. Langler (New Publications), 256
 — Society, the new American, 168
 — Terminology, Note on, by H. J. Mackinder, 732
 Geographie, Das Studium der, in und ausser der Schule, by Dr. Anton Stauber (New Publications), 399
 Géographie Générale, by P. Foncin (New Publications), 111
 Geography and astronomy, relations between, 151
 — for Schools. Part I. Practical Geography. By Alfred Hughes (New Publications), 112
 — International Congress of, at Paris, 447
 — Lectures on, delivered before the University of Cambridge, by General Strachey—
 Lecture I., 146
 " II., 205
 " III., 220
 " IV., 275
 — the Recognition of, by J. F. Heyes (New Publications), 53
 Geological Congress, International, fourth meeting of the, 40
 — Reports of the (New Publications), 807, 808
 — History, a Sketch of, by Edward Hull (New Publications), 255
 Geophysik, Beiträge zur, herausgegeben von Dr. Gerland (New Publications), 111
 Georgia, The Kingdom of, by O. Wardrop (New Publications), 807
 Gerard, E., *The Land beyond the Forest; Facts, Figures, and Fancies from Transylvania* (New Publications), 311
 Gerland, Prof. Dr., *Beiträge zur Geophysik*, herausgegeben von (New Publications), 111
 German Antarctic Expedition, the, 712
 — New Guinea, Admiral von Schleinitz's and Dr. Schrader's excursions in, 33, 34, 241
 — Count Pfeil's journey in the interior of, 591
 — Dr. Hollrung's journey in, 34, 600
 — surveys in the Cameroons region, 648

- German Togo-land, Progress of Explorations in, 799
- Germany. *Forschungen zur Deutschen Landes- und Volkskunde im Auftrage der Central-Commission für wissenschaftliche Landeskunde von Deutschland*, von Dr. R. Lehmann und Dr. A. Kirchhoff (New Publications), 668
- Gulde, latitude of, 162
- Gezivesk Pass, Caucasus Mountains, 692
- Gilbert, G. K., Notes on the Topographic Maps produced by the United States Geological Survey, 734
- Giraul river, West Africa, 448
- Glaciale, Mer, En route pour la, by Émile Petitot (New Publications), 179
- Glaciers of the Caucasus, Peaks, Passes, and, by D. W. Freshfield, 677 *et seq.*
 ——— Note on the Conservative Action of, by D. W. Freshfield, 779 *et seq.*
- Glamujökull glacier, Iceland, 307
- Gleichen, Lieut. Count, The Armed Strength of Portugal (New Publications), 538
- Gobi Desert, 492, 493
- Godwaan Berg, altitude of, 439
- Godwin-Austen or K 2 Peak, 380, 507, 516
 ——— Lieut.-Col., remarks on A Journey across Central Asia, &c., 515
 ——— remarks on the Report of the Council of R.G.S., 465
- Gök-dagh district, 629, *note*
- Gold Coast, Further Correspondence respecting the Affairs of the (c. 5357) (New Publications), 603
 ——— rainfall and temperature on the, 533
- Golubtzov, Madame, Researches in the Mountains of Tunka, 388
- Gordon, Lieut., on the warmth of Hudson's Bay, 550
 ——— Robert, On the Ruby Mines near Mogok, Burma, 261 *et seq.*
- Gorvatsch Pass, Caucasus Mountains, 691
- Gould, E. B., 128
 ——— Report by, on the trade of Siam, 798
- Grade, Herr, and Dr. Henrici, journey in Togo-land, West Africa, 309
- Graham, Alexander, and H. S. Ashbee, Travels in Tunisia, with a Glossary, &c. (New Publications), 107
- Grand Falls, Labrador, and other Falls, Letter from A. G. Guillemard on the heights of, 309
 ——— height of, 197, 198
 ——— river, Labrador, 194, 195, 196
 ——— table of meteorological observations taken on the, 202
- Grandidier, M., survey work in Madagascar, 649
- Greely, General A. W., on the rainfall west of the Mississippi, 308
- Greenland, Lieutenants Ryder and Bloch's recent journeys in, 238
 ——— M. Nansen's expedition across, 417, 591, 791
- Greenland, M. Nansen's projected journey across, 240
 ——— Papers on the Geology and Geography of (New Publications), 52
- Griechenland, Makedonien, und Süd-Albanien, oder: Die Südliche Balkan-Halbinsel, by Anton Tuma (New Publications), 175
- Grönland, La Seconde Expédition Suédoise au, par A. E. Nordenfjöld, traduite par Charles Rabot (New Publications), 542
- Groot, C. De, Herinneringen aan Blikong, Historisch, &c. (New Publications), 176
- Growse, F. S., A Supplement to the Fatehpur Gazetteer (New Publications), 48
- Guadalcanar Island, Solomon Islands, 353, 362
- Gunharibos river and natives, South America, 96, 97
- Guandú settlement, Rio Dóce, 63, 64
- Guardafui, Cape, and the Red Sea, Meteorology of, by General Strachey, 704 *et seq.*
- Guatemala Forests, by Miles Rock (New Publications), 604
 ——— Informe de la Direccion General de Estadística, 1887 (New Publications), 397
 ——— population of, 384
- Guay or Gwai river, Matabele-land, 295
- Gubuluwayo town, position of, 296
- Gudder's Bight river, Labrador, 193
- Guerne, M. de, on the lakes of San Miguel, 597
- Guillaume, H., The Amazon Provinces of Peru as a Field for European Emigration (New Publications), 178
- Guillemard, A. G., letter from, on the heights of Zambesi and Grand Falls, 309
 ——— Dr., appointed to the Geographical Lectureship at Cambridge, 447
- Gull Island Rapid, Labrador, 195
- Gumba village, French Sudan, 380
- Gunther, Dr. S., Johannes Kepler und der Tellurisch - Kosmische Magnetismus (New Publications), 743
- Guppy, Dr., remarks on Exploration of the Solomon Islands, 376
- Güssfeldt, Paul, Reise in den Andes von Chile und Argentinien (New Publications), 108
- Gvalda Glacier, Caucasus, 590
 ——— flowers of the, 695

H.

- HAAST, DR. VON, on the action of glaciers, 782
- Habenicht, Hermann, Ueber das Woher und Wohin des gegenwärtigen geophysischen Zustandes (New Publications), 480
- Hague, Dr. Arnold, survey of the Yellowstone Park, 712

- Haïti Island, Croquis des Weges von Jarabacoa bis Pico del Valle, Sto. Domingo, von Baron H. Eggers (New Maps), 186
- Hall, C. E. Strode, exploration of the Mai Kassa, or Baxter river, New Guinea, 708
- Hallett, H. S., proposed railway between Maulmein and China, 120, 131
 ——— remarks on Siam, 132
 ——— and A. R. Colquhoun, Report on the Railway Connection of Burma and China (New Publications), 48
- Hami, Turkistan, 497, 517
- Hamilton's and Wrontchenko's latitudes of places in Lycia-Pamphylia, 162, 163
- Hamy, Dr. E. T., La Mappemonde d'Angelino Dulcert, de Majorque (New Publications), 255
 ——— M., excursion to Gabes, 102
- Hann, J., Die Vertheilung des Luftdruckes über Mittel- und Süd-Europa (New Publications), 234
 ——— Temperatur- und Regenkarte von Japan (New Maps), 746
 ——— on the Distribution of Heat and Rainfall in Japan, 709
- Hannover, Oldenburg, &c., Generalkarte von (New Maps), 321
- Harman, Colonel, table of discharges of rivers in South-east Tibet, 582
- Harman Musa, Djebel, petrified coral-reefs at, 394
- Harrison, W. J., and H. R. Wakefield, Earth-knowledge (New Publications), 255
- Harrisse, Henry, Christophe Colombe et Savone (New Publications), 180
- Hartleben, A., Volks-Atlas (New Maps), 404
- Hartt, Professor, exploration of the Rio Dôce, 66
- Harvey, M., letter from, on the Agricultural Capabilities of Newfoundland, 457
- Harz, Neueste Karte vom, von O. Diercke und E. Gaebler (New Maps), 673
- Hasler, Dr. Emil, Centralsüdamerikanische Forschungen (New Publications), 253
- Hassenstein, Dr., Das Gebiet der Ewe-Stämme und die Deutschen Erwerbungen im Togo-Land (New Maps), 612
- Hatton, Frank, explorations in North Borneo, 141
- Hautreux, Formation des bancs de Terre-Neuve, d'après M. Thoulet (New Publications), 397
- Hawash river, source of the, 451
- Hawes, A. G. S., Report on the Commercial Resources of the Nyassa Region, 237
- Haws, robber tribe of Siam, 128, 131
- Hawz i Sultan, Persia, 630 and note
- Hayden, Dr. F. V., Obituary of, 423
- Hay, Miss M. B., The Earthquakes of May and June, 1887, in the Verny (Vernoe) District, Russian Turkestan, and their consequences, translated by, 638 *et seq.*
- Hayter, H. H., Victorian Year-book for 1886-7 (New Publications), 543
- Heaviside, Lieut.-Colonel, retirement of, from Indian Survey Department, 591
- Heiderich, Herr, on the mean elevation of Africa above sea-level, 589
- Heim, Professor, on the Glaciers of the Caucasus, 686 and note
- Helby, Lieut. E., survey work of, between Narbada river and Perim Island, 33
- Heligoland, Island of, Dr. H. Lindemann on the denudation of, 712
- Hellmann, Dr. G., Die Regenerverhältnisse der Iberischen Halbinsel (New Publications), 538
- Henrici, Dr., and Herr Grade, Journey in Togo-land, West Africa, 309
 ——— Ernest, Das Deutsche Togog-biet und meine Afrikareise, 1887 (New Publications), 476
- Henshaw, H. W., Perforated Stones from California (New Publications), 478
- Herald Islets, Kermadec Islands, 317
- Hesse-Wartegg, Herr von, Observations on Lake Valencia, Venezuela, 795
 ——— Der See von Tacarigua und die Eisenbahn von Valencia nach Puerto Cabello (New Maps), 812
- Hessels, J. H., Ortelius. Ecclesiae Londino-Batavae Archivum Tomus Primus, edited by (New Publications), 256
- Hetherwick, Rev. A., Notes of a Journey from Domasi Mission Station to Lake Namaramba, 25 *et seq.*
- Hettner, Dr. A., Reisen in den Columbianischen Anden (New Publications), 604
- Heyes, J. F., The Recognition of Geography, and the Aspects of Imperial Federation (New Publications), 53
- Heyfelder, Dr. O., Transkaspien und seine Eisenbahn (New Publications), 106
- Hind, Professor, Journey in Labrador, 191
- Hinman, Russell, Eclectic Physical Geography (New Publications), 671
- Hitchman, Francis, Richard F. Burton; his Early, Private, and Public Life (New Publications), 111
- Hobday, Major, Report on Survey Work in Burma, 1887-8, 452
- Hoernes, Dr. Moriz, Dinarische Wanderungen. Cultur- und Landschaftsbilder aus Bosnien und der Hercegovina (New Publications), 250
- Hogendorp, Lieut. Count V., Exploration of the Nanusa Islands, Dutch East Indies, 453
- Holder, Cockin, and Woolley, Messrs., visit to the Caucasus, 686
- Holdich, Major T., Report on Survey Operations in Western and North-western Afghanistan (New Publications), 395

- Hollrung, Dr., journey in German New Guinea, 34, 600
- Holme, Randle F., A Journey in the Interior of Labrador, 189 *et seq.*
- Holmes, W. H., The Use of Gold and other Metals among the Inhabitants of Chiriqui, Isthmus of Darien (New Publications), 478
- Holub, Dr., journey in the Batoka Country, 647
- Honduras, British, Map of, by A. Usher (New Maps), 812
- Hooge Veld Mount, Transvaal, 250
- Hooper, E. D. M., The Forests of the West Indies and British Honduras (New Publications) 742
- Horn Mount, Iceland, 307
- Houtum-Schindler, General A., notes on Demâvend, 85 *et seq.*
- on the New Lake between Kom and Teherân, by the Shah of Persia, translated by, 624 *et seq.*
- On the Length of the Persian Farsakh, 584 *et seq.*
- Howarth, H. H., remarks on A Journey across Central Asia, &c., 517
- Hudson, Henry, early voyages of, in Hudson's Bay and Strait, 551, 552
- Hudson's Bay and Hudson's Strait as a Navigable Channel, by Commodore A. H. Markham, 549 *et seq.*
- &c., letter from Dr. Rae on, 658
- Company in Labrador, 204
- Strait, ice floes in, 561, 565
- Hughes, Alfred, Geography for Schools. Part I. Practical Geography (New Publications), 112
- Hugues, Luigi, Guida per l'Insegnamento della Geografia (New Publications), 53
- Sul nome "America" (New Publications), 742
- Hull, Edward, A Sketch of Geological History (New Publications), 255
- Humphreys, Mr., Survey of the Rio Dôce, 84
- Hunter, Sir W. W., The Imperial Gazetteer of India (New Publications), 48
- Hurgronje, Dr. C. Snouck, Mekka (New Publications), 736
- Hurku Hills, Mongolia, 493, 494
- Hydrographical Surveys, Summary of, 417, 418
- Hydrography of South-eastern Tibet, The, by General Walker, 577 *et seq.*
- Hypsometry of the Dolomites, 454
- I.
- IBN BATUTA, journeys of, in Asia, 207
- Ibos tribe, West Africa, 758, 761
- Ibrahim-Hilmy, H. H. Prince, The Literature of Egypt and the Soudan from the earliest times to 1885 (New Publications), 541
- Iceland, M. Thoroddsen's journey to the North Cape of, 306
- Iceland, further explorations of M. Thoroddsen to, 792
- Ijos tribe, West Africa, 760, 761
- Iko-Morut, West Africa, 437
- Imbok, mausoleum at, 6
- Incwadi Yami; or Twenty Years' Personal Experience in South Africa, by J. W. Matthews (New Publications), 476
- Indaima's kraal, position of, 294
- India, A Manual of the Geology of. Part IV. Mineralogy, by F. R. Mallet (New Publications), 251
- Archæological Survey of, General Index to the Reports of the. Vols. i. to xxiii., by V. R. Smith (New Publications), 474
- Report of a Tour in the Panjâb and Râjpûtâna in 1883-4, by H. B. W. Garrick (New Publications), 478
- A Record of the Expeditions against the North-west Frontier Tribes since the Annexation of the Punjab, compiled by Lieut.-Col. W. H. Paget, revised by Lieut. Mason (New Publications), 737
- Gazetteer of the Ludhiâna District, 1888-9 (New Publications), 669
- Gazetteer of the Simla District, 1888-9 (New Publications), 669
- Great Trigonometrical Survey of, Synopsis of the results of the operations of the, vol. viia. (New Publications), 176
- Office, Catalogue of the Library of the (New Publications), 804
- Report on the Meteorology of, in 1885, by H. F. Blanford (New Publications), 48
- Southern, Archæological Survey of (New Publications), 48
- summary of surveys in, 421
- the commerce of, 656 *et seq.*
- The Imperial Gazetteer of, by Sir W. W. Hunter (New Publications), 48
- Indian Government Survey Maps (New Maps), 57, 401, 674, 746
- Marine Survey, 1886-7, work of the, 32
- Meteorological Memoirs, published under direction of H. F. Blanford. Vol. iv., Part iv. (New Publications), 474
- survey work during 1887-8, 650
- Indians of Labrador, The, 190, 201
- Indo-Burma, China Railway Connections a pressing necessity (New Publications), 737
- Ingram, W. H., Obituary of, 423
- Ingur river, 327
- Innthalas, Untersuchungen über die Schneegrenze im Gebiete des Mittleren, by F. K. Maurilaun (New Publications), 395
- International Geodetic Association, Reports of (New Publications), 807
- Geological Congress, fourth meeting of the, 40

International Geological Association, Reports of the (New Publications), 807, 808
Investigator, the survey work of the, 32
 Inyati, town of, position of, 296
 Irawadi river, the sources of the, 577, 578
 — Upper, Mr. Needham's expedition to the country between the Brahmaputra and the, 95
 Iribe, M., survey work in Madagascar, 649
 Irminger, Admiral C. L. C., Obituary of, 386
 Ishekli, latitude of, 162
 Issik-kul Lake, Russian Turkestan, 610
 Istanos, latitude of, 162
 Italia, Carta d' (New Maps), 184
 — designata da Carlo Cerri (New Maps), 321
 — Carta del Regno d' (New Maps), 745
 Italy. Reisekarte von Ober-Italien und den benachbarten Gebieten von Frankreich und Oesterreich, sowie dem grössten Theile der Schweiz (New Maps), 481
 Itatiaia-assu peak, Brazil, 61
 Iürükes tribe of Asia Minor, 104

J.

JACKSON CREEK, Little Andaman, 571
 — E. P., The Earth in Space (New Publications), 255
 — Lieut., survey work in the Southern Shan States, 452
 Jacobsen, Captain, Reise an der Nordwestküste Amerikas, 1881-3 (New Publications), 178
 James, Captain, voyage to Hudson's Bay, 553
 — H. E. M., journey across Central Asia, 485
 — The Long White Mountain, or a Journey in Manchuria (New Publications), 251
 Jameson, Mr., death of, 646
 Japan, North, Colonisation in, Mr. J. Quin on, 710
 — Temperatur- und Regenkarte von, von Dr. Julius Hann (New Maps), 746
 — The Distribution of Heat and Rainfall in, Herr J. Hann on, 709
 — Transactions of the Seismological Society of, vol. xi. (New Publications), 320
 Járawas, natives of Andaman Islands, 569
 Jaulán, The, by G. Schumacher (New Publications), 107
 Java, population and trade of, 453
 Jakri tribe, West Africa, 762
 Jeppe, Frederick, The Kaap Gold-fields of the Transvaal, 438 *et seq.*
 Jesus, Island of, Identity of the, 351 *note*
 Jimenoa, Rio, San Domingo, 240
 Joanne, Collection des Guides, Itinéraire général de la France, par Adolphe Joanne (New Publications), 735
 Joest, Wilhelm, Tätowiren, Narbenzeichnen und Körperbemalen (New Publications), 255
 No. XII.—DEC. 1888.]

Johannessen, Captain, discovery of an island in Arctic Ocean, 382
 Johnston, H. H., A Journey up the Cross River, West Africa, 435 *et seq.*
 — The Bantu Borderland in Western Africa, 633 *et seq.*
 — The Niger Delta, 749 *et seq.*
 Jordan, W. L., The Challenger Explorations (New Publications), 256
 — The Standard of Value (New Publications), 608
 Jordan, Recent Explorations East of the, by Captain A. M. Mantell, 719
 Joseph, The River of, the Fayoum and Raian Basins, by Cope Whitehouse, 733
 Judd, Professor, on the Eruption of Krakatoa (New Publications), 805
 Jukes-Browne, A. J., The Building of the British Isles; a study in Geographical Evolution (New Publications), 735
 Junker, Dr., remarks on the Stanley Expedition, 391, 588
 — on the peoples inhabiting the country between the Kibalé-Welle and the Nepoko, 390
 Juparará, Lagôa, Brazil, 62

K.

K 2, PEAK, of the Himalayan Range, 507, 508
 — proposed by General Walker to be called Godwin-Austen, 380, 516
 Kaap Gold-fields of the Transvaal, by Fred. Jeppe, 438 *et seq.*
 — history of the discovery of the, 443, 444
 — river, 439
 — Valley, the geological formation of the, 441, 442
 Kabardan tribe, Caucasus, 696
 Kaieteur Falls, British Guiana, height of, 310
 Kaisari, latitude of, 163, 164
 Kaiser Wilhelm Land, New Guinea, Dr. Hollrung's journey in, 600
 Kâj village, Persia, 627, *note*
 Kalde Glacier, 339, *note*
 Kalgan, Mongolia, 489
 Kampang Pet, Siam, 119, 131, 133
 Kara Châi river, 626, *note*
 — Eyuk Bazar, latitude of, 162
 — Ova Valley, 160
 — Kara or Belowti Pass, 500
 — Kirghiz tribe, 600
 Karakorum or Mustagh Mountains, 506
 Karagam glacier, Caucasus Mountains, 694
 Karamuk river, North Borneo, 5
 Karateghin and Eastern Bokhara, M. Lidsky's journey in, 534
 Karens tribe, Siam, 120
 Karpinsky, A., De la régularité dans la Configuration et la Structure des Continents (New Publications), 608
 Kara, Prince Masalsky's report on the Agriculture and Colonisation of the province of, 236

- Kaseni, Le, et la Louloua de Kwamouth à Louebo (New Maps), 611
- Kassala, Joseph Menges' Reisen zwischen, und dem Setit (New Maps), 258
- Kathay tribe, Burma, 266, 267
- Kaulbars, A. V., the most ancient channels of the Amu-daria, 182
- Kavir salt-swamp, Persia, 627, *note*
- Kay, S., Travels and Researches in Caffraria (New Publications), 609
- Kayser, G., Bibliographie d'Ouvrages ayant trait à l'Afrique, &c. (New Publications), 740
- Kazbek Mountain, Caucasus Mountains, 679
- Kazil Kaya Bazar, latitude of, 162
- Kelbia, Lake, M. Rolland on the geology of the district of, 598
- Kenamish river, Labrador, 193
- Kenamou river, Labrador, 193
- Kenia, Mount, partial ascent of, by Count Teleki, 533
- Kennedy, Captain J. C., Algeria and Tunis in 1845 (New Publications), 609
- Kenpou-Gakbo river, South-eastern Tibet, 578-582
- Kenyon, E. A., Traverse of the Route from Tavoy to the Boungte Pass into Siam (New Maps), 323
- Kerej river, 627, *note*.
- Kerges Küh range, 629, *note*.
- Kerlingarsfjöll Range, Iceland, 792
- Kernadec Islands, The, their Capabilities and Extent, by S. Percy Smith (New Publications), 316
- Kerner Von Marilaun, Fritz, Untersuchungen über die Schneegrenze im Gebiete des Mittleren Innthales (New Publications), 105
- Kerr, Walter Montagu, Obituary of, 385
- rumoured death of, 302
- Keskelny or Lubovny village, Russian Turkestan, 641
- Kestel, latitude of, 162
- Key, or Ké, Islands, The, by Captain G. Langen, 764 *et seq.*
- Kha Chay tribe, Siam, 125
- Khin-gan Mountains, MM. Garnak and Reasine's explorations of the, 304
- Khonas, latitude of, 162, 163
- Khorat, city of, Siam, 123
- Kinichta, From, to the sources of the Yellow River, and exploration of the northern border of Tibet, &c., by N. M. Prejevalsky (New Publications), 738
- Kitalé-Welle and the Nepoko, Dr. Junker on the peoples inhabiting the country between, 390
- Kiepert, H., Wall Map of Ancient Asia Minor (New Maps), 546
- Wall Map of Ancient Latium (New Maps), 545
- R., Politische Schul-Wandkarten der Länder Europa's. Russland, bearbeitet von (New Maps), 56, 809
- Stumme Physikalische Wandkarte von Russland (New Maps), 809
- Kilimandscharo, Zum Schneedom des, by Dr. Hans Meyer (New Publications), 603
- Kilimanjaro, Mount, Dr. Hans Meyer's expedition to, 34, 45, 448, 708
- Kimanis river, North Borneo, 138
- Kinabalu Lake, North Borneo, 136, 145
- Mountain, North Borneo, 3
- height of, North Borneo, 143, 144
- Kinabatangan country, North Borneo, 135
- river, North Borneo, 2
- Kindersley, B. T., Letter from, on the Dutch Boundary Line in North-eastern Borneo, 594
- Kingsford, W., The History of Canada (New Publications), 542
- Kirchhoff, Dr. A., und Dr. R. Lehmann, Forschungen zur Deutschen Landes- und Volkakunde im Auftrage der Central-Commission für wissenschaftliche Landeskunde von Deutschland (New Publications), 668
- Kirghiz of the province of Semirétchia, A. N. Krasnof on the, 54
- tribe, 500
- Kirin, fort at, 487
- Kizilbash and Tezyde tribes, 104
- Kizilje Dag, latitude of, 162
- Kiziltash Dag, latitude of, 161, 162
- Knutson, M., exploration in the Cameroons district, 380
- Kobua river, Guadalcanar Island, 363, 364
- Kom and Teherán, On the Lake between, by H.M. the Shah of Persia, translated by General A. Houtum-Schindler, 642 *et seq.*
- river, 627, *note*
- Komrúd village, Persia, 626, 627, *note*
- Konia, latitude of, 163
- Königberg Peak, Togo-land, 309
- Korfu, Originalkarte der Insel (New Maps), 55
- Koronos Mountains, 85, *note*
- Korotnef, M., voyage in the Malay Archipelago, 596
- Koschitzky, Max von, Deutsche Kolonialgeschichte (New Publications), 181
- Koshtantau Mountain, Caucasus, 589
- Peak, height of, 688, 689
- Kostenko, M., on the population of Turkestan, 304
- Kotch Hissar, latitude of, 163
- Kotelny, Island of, 249
- Koula, latitude of, 163
- Kóyukuk river, Alaska, 397
- Krakatoa, The Eruption of, and subsequent phenomena. Report of Committee of Royal Society (New Publications), 805
- Krasnof, Herr von, journey in the Thian Shan, 598, 599
- on the Kirghiz of the province of Semirétchia, 54
- Report on the Agriculture and Colonisation in the Provinces of Semiré-chinsk, 235

Krestowaja Gora, Caucasus Mountains, 679
Kuei-hua-cheng or Kuku-khoto, Mongolia, 491

Küh i Makraj range, 629, *note*

— Mareh hills, Persia, 628, *note*

Kuilu river, 101

Kund and Tappenbeck, Lieuts., Results of Expedition to the Cameroons, 447

Kunge-Alatau range, 640

Kungmalane plain, Siam, 126

Kurdestan en Mésopotamie et en Perse, Au, by Henry Binder (New Publications), 395

Kurdistan, M. Henri Binder's travels in, 173

Kurds of Asia Minor, 104

Kurtz, Dr. F., and Dr. W. Bodenbender's explorations of the Chilian Andes, 168

Kuru or Lhobrak Chu river, 420

Kuznetsof, M., on the waters of the Sea of Azof, 596

Kyanyat route to the Ruby Mines, 263

Kyatpyen tribe, Burma, 268

L.

LABRADOR, A Journey in the Interior of, by Randle F. Holme, 189 *et seq.*

— coast of, inhabitants of, 208

Lacasse, Pere, journey in Labrador, 191

Lacouperie, Prof. A. T. de, Did Cyrus introduce writing into India? (New Publications), 610

— The Miryeks or Stone-men of Corea (New Publications), 610

— The Old Babylonian Characters and their Chinese Derivates (New Publications), 610

— The Old Numerals, the Counting-rods, and the Swan-Pan in China (New Publications), 610

— The Sinim of Isaiah not the Chinese (New Publications), 610

— The Yueh-ti and the Early Buddhist Missionaries in China (New Publications), 610

Lagbe, latitude of, 162

Lagoa, Correspondence respecting the War between Native Tribes in the Interior, and the Negotiations for Peace conducted by the Government of (New Publications), 50

Lamag river, North Borneo, 3

Landau, Baron von, Travels in Asia, Australia, and America (New Publications), 744

Langen, Captain G., The Key, or Ké, Islands, 764 *et seq.*

Langler, J. R., Hughes's Picturesque Geographical Readers (New Publications), 256

— remarks on the presentation of prizes to students of Training Colleges, 469

Lansdell, Henry, Through Central Asia, with a Map and Appendix on the Diplomacy and Delimitation of the Russo-Afghan Frontier (New Publications), 49

Lapérouse Centenary Meeting of Paris Geographical Society, 471

Lapland, Russian, exploration of, 454

— Swedish, M. Svenonius's exploration of, 454

Larrien, Abbé, La Grande Muraille de Chine (New Publications), 315

Latium, Wall Map of Ancient, H. Kiepert (New Maps), 545

Latpari Pass (Caucasus Mountains), 327

Latzina, F., Geografía de la República Argentina (New Publications), 742

Layard, Mrs. Granville, Through the West Indies (New Publications), 110

— Sir Henry, Early Adventures in Persia, Susiana, and Babylonia, &c. (New Publications), 49

Lea, Rev. T. S., The Island of Fernando do Noronha in 1887, 424 *et seq.*

Lebombo range, Transvaal, 439

— to Lourenço Marques, railway from, 446

Lecomte, Pere, explorations in West Africa, 248

Le Conte, J., Flora of the Coast Islands of California (New Publications), 51

Leesaw tribe, Burma, 269

Lehmann, Dr. R., und Dr. A. Kirchhoff, Forschungen zur Deutschen Landes- und Volkskunde im Auftrage d. Central-Commission für wissenschaftliche Landeskunde von Deutschland (New Publications), 668

Leila Falls, Rio S. José, 69

Lemos, A. M. Díaz, Compendio de Geografía de la República de Colombia (New Publications), 110

Lepsius, Dr. R., Geologie von Deutschland (New Publications), 803

Lepsey's Grammar and Vocabulary of the Language of Bearn for Beginners, translated by R. G. Molyneux (New Publications), 538

Lesseps, M. de, on the locks of the Panama Canal, 241

— Le Canal de Panama, au point de vue géographique, maritime et commercial, 665, 666

Lhobrak or Kuru Chu river, 420

Liakov or New Siberian Islands, Baron von Toll and Dr. Bunge's work in the, 414

Library of R.G.S., Report on the, 464

Lidsky, M., journey in Karateghin, 534

Liegard, Stephen, La Côte d'Azur (New Publications), 736

Liguri, Riviere, e delle Alpi Marittime, Carta Geologica della (New Maps), 56

Likwenu river, 25

Lima, Peruvian Geographical Society at, Meeting of the New, 384

Lindemann, Dr. H., on the denudation of the Island of Heligoland, 712

Lindley, Walter, and J. P. Widney, California of the South (New Publications), 397

- Lindsay, Mr., second journey across the Australian continent, 711
 Linhares village, Rio Dôce, 68
 Lista, Ramon, *Viaje al País de Los Onas*, Tierra del Fuego (New Publications), 542
 Lister, J. J., remarks on An Account of Christmas Island, 624
 Little, A. J., *Through the Yangtse Gorges; or Trade and Travel in Western China* (New Publications), 252
 — Mr., explorations in Borth Borneo, 143
 Logan, William, *Malabar: Madras* (New Publications), 539
 Lohit Brahmaputra river, 577
 Lokan river, North Borneo, 3
 Lombardia, *Carta stradale ed alpina dell'Alta, de E. Nessi* (New Maps), 400
 London and its Environs, Philips's New Map of (New Maps), 400
 — Library, Catalogue of the (New Publications), 744
 Longmans' Junior School Geography, by George G. Chisholm (New Publications), 398
 — School Geography for Australasia, by G. G. Chisholm (New Publications), 543
 Longnon, Auguste, *Atlas Historique de la France* (New Maps), 260
 Lourenço Marques to the Lebombo, railway from, 446
 Low, H. B., *Obituary of*, 423
 Luang Phrabang town, Siam, 127
 Lüdde, J. G., *Die Geschichte der Methodologie der Erdkunde* (New Publications), 55
 Ludhiána District, India, *Gazetteer of the*, 1888-9 (New Publications), 669
 Luengue river, Botoka country, 647
 Lujenda river, 31
 Lu river of Tibet, 577 *et seq.*
 Luschan, Dr. von, *journeys in Asia Minor*, 103
 Lycia-Pamphylia, *Note on the Map of*, by Professor W. M. Ramsay, 160 *et seq.*
 Lyon, Captain, *voyage to Hudson's Bay*, 555
- M.
- MACAULAY Island, extent of, 316, 517
 McCarthy, J., *award of Murchison Grant to*, 300, 468
 — — — remarks on Siam, 132, 133
 — — — Siam, 117 *et seq.*
 McFarlane, Rev. S., *Among the Cannibals of New Guinea* (New Publications), 478
 McConnell, Mr., *Surveys in the Northern Interior of British Columbia*, 382
 McCormick, R., *Voyages of Discovery in the Arctic and Antarctic Seas, and round the World* (New Publications), 610
 Macédoine, par F. Bianconi (New Maps), 809
 Machinga tribe, 27
 Machukulumbe tribe, S. Africa, 648
 Mackenna, B. V., *A traves de los Andes* (New Publications), 745
 Mackenzie Basin, Great, Canada, *Report of the Select Committee of the Senate appointed to enquire into the resources of the* (New Publications), 741
 — Colin, remarks on the Island of Fernando do Noronha, 434
 — — — remarks on an Exploration of the Rio Dôce and its northern tributaries, 80
 — — — John, *Austral Africa, Losing it or Ruling it* (New Publications), 50
 — — — Rev. J., *Bechuanaland and the Land of Ophir*, 725 *et seq.*
 Mackinder, H. J., *Note on Geographical Terminology*, 732
 — — — *Report on the Progress of Geography at Oxford during the year*, 531
 Maclean, Mr., *journey in Labrador*, 191
 Maclear, Captain, *visit to Christmas Island*, 615
 Madagascar, *Carte de dressée par le Père E. Roblet* (New Maps), 746
 — — — *Magazine and Antananarivo Annual*, No. XI., edited by Rev. J. Sibree and Rev. R. Baron (New Publications), 253
 — — — recent survey work by the French in, 649
 Mādan tribe, Mesopotamia, 393
 Madre de Dios, *Navigacion del, Viaje del Padre Armentia, Biblioteca Boliviana de Geografia e Historia* (New Publications), 741
 Magalhães, *Conto de, O Selvagem* (New Publications), 745
 Mainthas tribe, Burma, 269
 Mai Kassa or Baxter river, New Guinea, C. E. Strobe Hall's *Explorations of the*, 708
 Majorca, *Letters from*, by C. W. Wood (New Publications), 803
 Makalaka tribe, 726
 Malabar, *Madras*, by William Logan (New Publications), 539
 Malapi, North Borneo, 140
 Malay Archipelago, *summary of progress of explorations in*, 415
 — — — *Peninsula, minerals of the*, 122
 — — — tribes of the, 121
 Malayta Island, 356
 Mallet, F. R., *A Manual of the Geology of India, Part IV. Mineralogy* (New Publications), 251
 Mallicollo Island, Port Sandwich at, 355
 Maloes, Mount, 25
 Malta, *Tanger, und Teneriffe nach Westindien in 1885 und 1886, Reise S.M. Schiffe "Zrinyi," über*, by Jerolini Benko (New Publications), 179
 Mamboia, *From Mombasa to*, Bishop Parker's and Rev. J. Blackburn's *journey*, 92
 Marnisson Pass, Caucasus Mountains, 679

- Manchuria and Peking to Kashmir, a journey across Central Asia, from, over the Mustagh Pass, by Lieut. Young-husband, 485 *et seq.*
- The Long White Mountain, or a Journey in, by H. E. M. James (New Publications), 251
- climate and population of, 486, 487
- Mandalay, Burma, railway to, 262
- Mangu, Lake, East Africa, 94
- Manitoba, area of, 39
- Mansfield, Sir C., on the prospects of trade of the Peruvian Port of Mollendo, 455
- Mantell, Captain A. M., Recent Explorations East of the Jordan, 719
- Mantiqueira, Serra da, Brazil, 61
- Mantsunyane river, Basuto land, 524
- Manzarfeh, Persia, 628, *note*
- Maps, New—
- Africa, 58, 114, 186, 258, 323, 402, 482, 546, 611, 675, 746, 811
 - America, 115, 186, 258, 323, 403, 482, 747, 812
 - Arctic, 745
 - Asia, 186, 258, 323, 401, 482, 546, 674, 746
 - Astronomical, 188
 - Atlases, 60, 187, 260, 403, 483, 548, 676, 748
 - Australasia, 186, 260, 482, 812
 - Charts, 59, 115, 187, 260, 323, 482, 547, 612, 675, 748
 - Europe, 55, 112, 183, 257, 321, 400, 480, 545, 679, 745, 809
 - Indian Government Surveys, 57, 401
 - Ordnance Surveys, 56, 114, 185, 257, 322, 401, 481, 545, 611, 674, 809
 - Photographs, 404
 - World, 55, 183, 809
- Perspective, and Common Maps, by A. W. Clayden, 668
- Map Room of R.G.S., Report on the, 463
- Marcel, G., and J. Gaultier, Reproduction of Ancients Maps by, 99
- Marescaux, Lieut., Visit to Christmas Island, 616
- Margry, Pierre, Mémoires et Documents pour servir à l'histoire des Origines Françaises des Pays d'Outre-Mer. Découvrements et Établissements des Français dans l'Ouest et dans le Sud de l'Amérique Septentrionale (New Publications), 742
- Markham, C. R., Award of Founder's Medal to, 300
- remarks on receiving the Founder's Medal, 466
- Commodore A. H., Hudson's Bay and Hudson's Strait as a Navigable Channel, 549 *et seq.*
- Marmolata, height of, 454
- Maroc, Reconnaissance au, 1883-4, by Viscomte C. de Foucauld (New Publications), 670
- Martin, W. R., A Text-Book of Ocean Meteorology (New Publications), 54
- Masalsky, Prince, report on the agriculture and colonisation of the province of Kars, 236
- Mashona Land, F. C. Selous' Explorations in, 164
- gold-mines of, 729
- Mason, J. W., Movable (Tropic) Diagram of the Seasons (New Maps), 809
- Massaua, Keren, Aksum e Adigrat, Carta dimostrativa della regione compresa fra, (New Maps), 58
- Keren, Lula, Asmara e dintorni (New Maps), 323
- Matabele-land, F. C. Selous's further Explorations in, 293 *et seq.*
- Note by Mr. Turner on Mr. Selous's Map of, 296
- tribe, 726
- Matabili, Mashona, and Bamangwato Countries, by G. Cawston (New Maps), 812
- Mathers, E. P., The Gold Fields revisited, being Further Glimpses of the Gold Fields of South Africa (New Publications), 315
- Mr., on the salubrity of Barber-ton, 441
- Mathews, Edward D., British Guiana and Venezuela (New Publications), 315
- Matthews, J. W., Incwadi Yami; or Twenty Years' Personal Experience in South Africa (New Publications), 476
- Mauch Berg, altitude of, 439
- Maulmein and China, proposed railway between, 120, 131
- Maund, Lieut. E. A., on positions of towns in Matabele-land, 296
- Maurilaun, F. K., Untersuchungen über die Schneegrenze im Gebiete des Mittleren Innthales (New Publications), 395
- Maury, Matthew Fontaine, A Life of, by Diana F. M. Corbin (New Publications), 479
- Mayne, Admiral R. C., Summary of Explorations in British North Borneo, 134 *et seq.*
- Medals, Royal, and other Awards, announcement of the adjudication of the, for the year 1888, 300
- presentation of the, 466
- Meinam and Meinam Kong valleys, 118
- Chau Phraya river, Siam, 118
- Mei Ping river, Siam, 119
- Mekka, Von Dr. C. Snouck Hurgronje (New Publications), 786
- Mekong, Upper, Navigability of the, 597
- Mello, Professor de, on Geographical Education in Portugal, 651
- Memeh, R., Cameroon district, 380
- Mendoça, Captain B., Explorations in the Province of Parana, 650
- Meo tribe, Siam, 125

- Mercier, Ernest, Histoire de l'Afrique Septentrionale (Berberie) depuis les Temps les plus reculés, jusqu'à la Conquête Française, 1830 (New Publications), 603
- Mérida, Die Cordillera von, nebst Bemerkungen über das Karibische Gebirge, von Dr. W. Sievers (New Publications), 604
- Mesopotamia, South, Dr. B. Moritz on the Geography and Ethnography of, 391, 392
- Mestia Pass, Caucasus mountains, 338, *note*
- Metchnikoff, Léon, Les Grands Fleuves Historiques (New Publications), 318
- Meteorological Observations in the Island of Barbadoes, 593
- Meyer, Dr., Ascent to the Foot of the Crater-wall of Kilimanjaro, 34, 45
— corrections to his account of his ascent of Kilimanjaro, 448
— Expedition to Mount Kilimanjaro, 708
— Zum Schneedom des Kilimandscharo (New Publications), 603
- M—H, Work of the Native Explorer, in Tibet and Nepal in 1885-6, 89 *et seq.*
- Michel, Chr., Alpen-Karte (New Maps), 480
- Middleton, Captain, voyage to Hudson's Bay, 554
- Mill, H. R., The Salinity of the Clyde Sea Area, and Sea Temperature on the Continental Shelf, 667
- Mississippi, General A. W. Greely on the Rainfall west of the, 308
- Mitford, Major-General R., Orient and Occident (New Publications), 744
- Mkomazi River, East Africa, 94
- Mobangi River, Captain Van Gele's discovery of the Connection of the, with the Welle-Makua, 234
— Lieut. Van Gèle's Exploration of the, 300
- Möbius, Professor, on the Zoological and Physical Conditions of the Baltic Sea, 173
- Mogok, On the Ruby Mines near, Burma, by Robert Gordon, 261 *et seq.*
— town of, population, 266, 273
- Mohilla, Island of, M. Vincent on the, 598
- Mohn, H., and H. H. Hildebrandson, Les Orages dans la Péninsule Scandinave (New Publications), 538
- Mollendo, Peruvian Port of, Sir C. Mansfield on the prospects of trade of, 455
- Molukken, Die, von Dr. H. Bokemeyer (New Publications), 539
- Mombasa to Mambaia, Bishop Parker's and Rev. J. Blackburn's journey from, 92
- Monaco, Prince A. de, Deuxième campagne scientifique de "l'Hirondelle" dans l'Atlantique Nord (New Publications), 608
— — — Investigations of the Atlantic Currents, 472, 473
- Monaco, Prince A. de, Sur la troisième campagne scientifique de "l'Hirondelle" (New Publications), 608
— — — Sur une expérience entreprise pour déterminer la direction des courants de l'Atlantique Nord (New Publications), 608
- Mongol tribe, 497
- Mongolia and inhabitants, 490
- Monla Kachung Pass, Bhutan, 420
- Monnier, M., journey across South America, 471
- Moose, town of, Hudson's Bay, 566
- Morea, Dr. Philippson, on the settlement and commerce of, 801, 802
- Morena, J. L., Compendio de Jeografia de Bolivia redactado para el uso de la juventud, and Nociones de Geografia de Bolivia (New Publications), 604
- Morgan, E. Delmar, 'Little Russia,' 668
— J., A Complete History of Algiers (New Publications), 610
- Morier, Sir R., report on the agriculture and colonisation in the Provinces of Semirechinak and Kars, 235
- Moritz, Dr. B., on the geography and ethnography of South Mesopotamia, 391, 392
- Morocco, Progress of Mr. J. Thomson in, 588, 647
- Mossamedes and Benguella, E. W. Parson's report on, 448
- Mott, A. J., Notes on Easter Island (New Publications), 610
- Mountain Upthrasts, by C. A. White (New Publications), 609
- Moxly, J. H. Sutton, An account of a West Indian Sanatorium, and a Guide to Barbados (New Publications), 178
- Muang Ngan, Siam, 127
- Muddy Lake, Labrador, 194
- Muller, H. P. N., Herinneringen uit Afrika (New Publications), 610
- Mummery, A. F., Visit to the Caucasus Mountains, 589
- Murray, John, Report on the Scientific Results of the Voyage of H.M.S. *Challenger*, prepared under the superintendence of the late Sir C. Wyville Thomson and. Zoology, vols. xxiii.-xxvii. (New Publications), 543, 744
- Murray's Handbook for Travellers in Lower and Upper Egypt (New Publications), 177
— — — in Surrey, Hampshire, and Isle of Wight (New Publications), 539
— — — of Rome and its Environs (New Publications), 47
- Murut tribe, 12, 13, 15
- Mustagh glazier, 508, 509
— pass, 506, 508, 509, 516
- Mutum village, Brazil, 75

N.

- NADAROF, Lieut.-Col. I., survey of the Northern Ussuri Country, 181, 182
- Namaramba, Lake, Notes of a Journey from Domasi Mission Station, Mount Zomba, to, by the Rev. A. Hetherwick, 25 *et seq.*
- Names and Places, by J. D. Whitney (New Publications), 181
- Nansen, M., expedition across Greenland, 240, 417, 591, 791
- Nanusa Islands, Dutch East Indies, Lieut. Count v. Hogendorp's exploration of the, 453
- Narcondam Island, 32
- Nascopee, Fort, Labrador, 192
- Ndogo lagoon, West Africa, 37
- Neate, Charles, remarks on an exploration of the Rio Dôce and its northern tributaries, 84
- Nederlanden, Kaart van het Koninkrijk der, van E. de Geest (New Maps), 673
- Nederlandsch-Indië, Handboek van Cultur- en Handelsondernemingen in (New Publications), 539
- Oost Indië, Kaart van (New Maps), 675
- Needham, J. F., Expedition to the country between the Brahmaputra and the Upper Irawadi, 95
- Exploration of route between Assam and Upper Burma, under direction of, 377
- Nemrud Dag, tomb of Antiochus I. on, 103
- Neptune, voyage of the, to Hudson's Bay, 558
- Nessi, E., Carta stradale ed alpina dell' Alta Lombardia (New Maps), 400
- Neumayer, Dr. G., Anleitung zu Wissenschaftlichen Beobachtungen auf Reisen in Einzel-Abhandlungen, Herausgegeben von (New Publications), 607
- Neusibirischen Inseln, Karte der, und des Jana-Landes (New Maps), 186
- Neu-Vorpommern und der Insel Rügen, Karte von, Von Dr. F. von Hagenow (New Maps), 673
- Neuwied, Prince von, explorations of Rio Dôce, 66
- New Sheher, latitude of, 163
- New Britain, Admiral von Schleinitz's exploration of the coast of, 303
- Georgia Island, cannibalism and head-hunting at, 374, 375
- Guinea, Among the Cannibals of, by Rev. S. McFarlane (New Publications), 478
- British, discovery of St. Joseph river in, 33
- Mr. T. Bevan's fifth expedition to (New Publications), 606
- Dr. Hollrung's journey in, 34, 600

- New Britain, Explorations and Adventures in, by Captain J. Strachan (New Publications), 605
- German, Admiral von Schleinitz's and Dr. Schrader's excursions in, 33, 34
- Count Pfeil's journey in the Interior of, 591
- Dr. Schrader's journey in, 241
- Mai Kassa or Baxter river in, C. E. Strode Hall's explorations of the, 708
- Père Couppe's explorations in, 248
- summary of progress of explorations in, 415, 416
- Siberian Islands, Baron Toll's journey to the, 248, 249
- South Wales, Annual Report of the Department of Mines, for 1886 (New Publications), 479
- Geographical Survey of (New Publications), 110
- Rowley's Map of the Colony of (New Maps), 186
- The Wealth and Progress of, 1886-87, by T. A. Coghlan (New Publications), 398
- Zealand, Colonial Museum and Geological Survey of. Reports of Geological Explorations during 1885, 1886-87 (New Publications), 479
- Reports on the Mining Industry of (New Publications), 479
- Statistics of the Colony of, for 1886 (New Publications), 479
- Newfoundland, climate of, 204
- Letter from M. Harvey on the Agricultural Capabilities of, 457
- Letter from Major-General R. Dashwood on the Resources of, 652
- Newland, S., The Far North Country (New Publications), 543
- Newmap, Mr., on the state of wheat culture in Chile, 796
- Ngové language, 37
- Nicaragua and Costa Rica, Inter-oceanic Canal of, Chart of the World, showing Distances Saved by the (New Maps), 747
- Nicobaren, Ein kurzer Besuch auf den. Geschildert von Dr. Svoboda (New Publications), 738
- Nicobars, Great and Little, surveys of, 421
- Nicolaky, M., researches in the basin of Lake Balkash, 596
- Niger Delta, The, by H. H. Johnston, 749 *et seq.*
- Niger, Voyage of the French gunboat, to Timbuktu, 164
- Nikolsky, A. M., on the fisheries of the Aral basin, 180
- Nile to the Euphrates, Notes on the Geography of the Region from the, as known to the Ancient Egyptians, by Rev. H. G. Tomkins, 717

Nil-Länder, Karte der (New Maps), 186
 Njong, Great, river, West Africa, 447
 Nongkhai, town, Siam, 124
 Nong-tang lake, Siam, 126
 Nordenskiöld, A. E., Den första på verkliga iakttagelser grundade karta öfver norra Asien (New Maps), 258
 ——— La Seconde Expédition Suédoise au Grönland, traduite par Charles Rabot (New Publications), 542
 ——— new work on African Maps, 589
 ——— Vega-Expeditionens Vetenskapliga Iakttagelser, vols. iv. and v. (New Publications), 52
 North Cape of Iceland, M. Thoroddsen's journey to the, 306
 North-west river, Labrador, 194
 Ntorendenga swamp, 29
 Nuevo Valle, San Domingo, 240
 Nuhu-roa Island, Ké Islands, 768
 Nyassa and Tanganyika Lakes, Map of the country between, compiled by E. G. Ravenstein (New Maps), 747
 Nyassa R. gion, Mr. Hawes' report on the Commercial Resources of the, 237

O.

Oakeley, H. E., and J. G. Fitch, Letter from, on Geographical Education in Training Colleges and Elementary Schools, to Sir Beauchamp Walker, 297
 Obang-Obang bird's-nest caves, 8
 Oberdorf, Captain, survey of the Upper Gambi and Faleme rivers, 379
 Ober-Elsaas, Spezialkarte vom (New Maps), 321
 Obituary List for 1887-88, 422
 Obock, Les Français à, by Denis de Rivoire (New Publications), 51
 Ocean Meteorology, A Text-Book of, by W. R. Martin (New Publications), 54
 Ockley, Simon, An Account of South-west Barbary, &c. (New Publications), 610
 Oesterreichisch - Ungarischen Monarchie, Spezialkarte der (New Maps), 184, 321, 673
 ——— See Österreichisch.
 Oesterreichsch - Ungarischen Monarchie, Uebersichtskarte der (New Maps), 184
 Oesterreich-Ungarischen Armee, Artaria's Universal-Administrativ-Karte der (New Maps), 400
 ——— Eisenbahnen, Die (New Maps), 113
 ——— Ungarn, Eisenbahn- und Post-Communications-Karte von (New Maps), 113
 Ogilvie, Mr., Surveys in the Northern Interior of British Columbia, 382
 Oil Rivers, West Africa, 749
 Old Calabar, town and natives, West Africa, 753, 754
 Öngés, natives of Little Andaman Islands, 570, 572, 575
 Opobo, West Africa, 758

Oran et l'Algérie en 1887, Notices Historiques, Scientifiques, et Economiques, edited by Dr. G. Seguy (New Publications), 671
 Ordinaire, M. O., New Route from Peru to the Upper Amazons, 650
 Ordnance Survey Maps (New Maps), 56, 114, 185, 257, 322, 401, 481, 545, 611, 674, 809
 Orient and Occident, by Major-General R. Mitford (New Publications), 744
 ——— L'Extrême, by Paul Bonnetain (New Publications), 395
 Orinoco, M. Chaffanjon's journey to the head waters of the, 96, 100
 Orontes Mountains, 85, *note*
 Oropeza, S., Intereses Nacionales. Cuestion de Límites entre las Repúblicas de Bolivia y del Perú (New Publications), 604
 Orrery, Nouvelle Machine Cosmographique, construite par Léon Girod (New Maps), 188
 Ortelius, Abraham, Ecclesiæ Londino-Batavæ Archivum Tomus Primus. Edited by J. H. Hessels (New Publications), 256
 Ortrov, F. Van, Esquisse Géographique de l'Afghanistan (New Publications), 395
 Oshanin, M., Visit to the Earthquakes in the Verney (Vernoe) District, 638
 Ossetes tribe, Caucasus, 702, 703
 Ostalpen, Die Gletscher der, von Dr. E. Richter (New Publications), 803
 Österreichisch-Ungarische Monarchie, Die, mit dem Occupations-Gebiete Bosnien und Hercegovina (New Maps), 257
 ——— Uebersichtskarte der Eisenbahnen der (New Maps), 113
 Ovis Poli, 495
 Oxenham, E. L., Historical Atlas of the Chinese Empire (New Maps), 403
 ——— Mr., on the Overflow of the Yellow River, China, 535
 Oxford, Geographical Education, the Year's Progress at, Mr. Mackinder's report on, 531
 Oxus, Trans-Caspian railway bridge over the, 246

P.

Pacific Islands, Western, A Series of 76 photographs of the, taken by Staff-Surgeon H. E. F. Cross (New Maps), 404
 Padamo river, South America, 96
 Padas river, North Borneo, 10 *et seq.*
 Pagalan river, North Borneo, 12, 13
 Paget, Lieut-Colonel W. H., A Record of the Expeditions against the North-West Frontier Tribes since the Annexation of the Punjab, compiled by (New Publications), 737
 Palæolithic Man in N.W. Middlesex, by J. A. Brown (New Publications), 105

- Palestine. Grundzüge der Landesnatur des Westjordanlands, by Otto Ankel (New Publications), 175
 ——— Illustrated, by Sir Richard Temple (New Publications), 474
 Palgrave, W. G., Obituary of, 713
 Palgucho Lake, Tibet, 90
 Paloung tribe, Burma, 267, 268
 Pamir-Gebiete, Die, by Dr. W. Geiger (New Publications), 254
 ——— Mountain System, Orographical Sketch of the, by N. A. Sévertsof, 182
 Panama Canal, M. de Lesseps on the Locks of the, 241
 ——— progress of, 169
 ——— Le Canal de, au point de vue géographique, maritime et commercial, by M. F. de Lesseps, 665, 666
 Pancas, Rio, Brazil, 70
 Pangula Pass, Tibet, 90
 Panthay tribe, Burma, 269
 Papar river, North Borneo, 135
 Papuans of New Guinea, 602
 Parachoatras Mountains, 85, *note*
 Paraguay, Captain Sandalio Sosa and Dr. De Bourgade's journey through, 167
 Parana, Province of, Captain B. Mendoça's explorations in the, 650
 Parasang, Persian measure, length of, 584, 586
 Paris Geographical Society, award of Medals of the, 471
 ——— 'Proceedings'
 of, November 18th, 1887, 100
 ——— December 2nd, 1887, 101
 ——— 16th, 1887, 102
 ——— January 6th, 1888, 169
 ——— 14th, 1888, 171
 ——— 20th, 1888, 172
 ——— February 3rd, 1888, 246
 ——— 17th, 1888, 247
 ——— March 2nd, 1888, 388
 ——— 16th, 1888, 389
 ——— April 6th, 1888, 389
 ——— 9th, 1888, 390
 ——— 20th, 1888, 471
 ——— May 4th, 1888, 471
 ——— 18th, 1888, 472
 ——— June 1st, 1888, 595
 ——— 15th, 1888, 597
 ——— Library,
 Report on, 172
 ——— International Congress of Geography at, 447
 Parker, Bishop, and Rev. J. Blackburn's journey from Mombasa to Mamboia, 92
 Parry, Sir Edward, voyage to Hudson's Bay, 554
 Pascoe, Staff-Commander, survey of the Yé river, 33
 Pasi Mta Pass, Caucasus Mountains, 692
 Patagonia, South, Lieut. A. del Castillo's explorations on the Watershed of, 651
 Paton, William Agnew, Down the Islands: a Voyage to the Caribbees (New Publications), 178
 Patton, J. H., Natural Resources of the United States (New Publications), 253
 Pavie, M., journey from Laos to Tonking, 472
 Peek, Cuthbert E., Meteorological Observations for 1887, made under the superintendence of, at Rousden Observatory, Devon (New Publications), 399
 Peloponnesus, country of, settlement and commerce of, 801
 Penck, Prof. A., Die Bildung der Durchbruchthäler (New Publications), 608
 ——— Geographische Abhandlungen, herausgegeben von (New Publications), 319, 743
 Penning, Mr., on the geological formation of the Kaap Valley, 441
 Penungah, North Borneo, 6, 7
 Peralta, D. Manuel M. de, El Canal Inter-oceanico de Nicaragua y Costa-Rica en 1620 y en 1887 (New Publications), 315
 Pernambuco, Brazil, Trade and Agriculture in, 535
 Peroz, Captain, survey of Milo and Bure valleys, 379
 Persia, H.M. The Shah of, On the New Lake between Kom and Teheran. Translated by General A. Houtum-Schindler, 624 *et seq.*
 ——— Susiana, and Babylonia, Early adventures in, &c., by Sir Henry Layard (New Publications), 49
 Persian Farsakh, On the length of the, by General Houtum-Schindler, 584 *et seq.*
 Peru, The Amazon Provinces of, as a Field for European Emigration, by H. Guillaume (New Publications), 178
 ——— to the Upper Amazons, M. O. Ordinaire's new route from, 650
 Peruvian Geographical Society, Meeting of the new, 384
 Petchikapou, Lake, Labrador, 199
 Petitot, Emile, En route pour la Mer Glaciale (New Publications), 179
 ——— Traditions Indiennes du Canada, Nord-Ouest (1862-82) (New Publications), 743
 Petri, Dr. Z. Y., on the aims and scope of geography, 180
 Peutingersche Tafel, Weltkarte des Castorius genannt die (New Maps), 183
 Pfeil, Count, journey in the Interior of German New Guinea, 591
 ——— Journey through Useguha, 94
 Philippson, Dr., on the settlement and commerce of Morea, 801, 802
 Phillips' New Library Map of London and its Environs (New Maps), 40
 Phillips, Professor, on the geological formation of the Kaap valley, 45
Phenicopterus roseus, Savah Lake, 631 *and note*
 Physical Geography, Eclectic, by Russell Hinman (New Publications), 671
 ——— Our Earth and its Story; a Popular Treatise on, edited by Robert Brown (New Publications), 318

- Physical Geography prepared on a new and original plan by J. D. Quackenbos, &c., Appleton's American Standard Geographies (New Publications), 398
- Physiography, Elementary, an introduction to the study of Nature, by John Thornton (New Publications), 255
- Pichan, Turkistan, 499
- Pierce, J., The Economic Use of the Plane-table in Topographical Surveying (New Publications), 608
- Pigot, visit of the, to Christmas Island, 614
- Pilcomayo, M. Thouar's explorations on the, 597, 598
- Pilling, J. C., Bibliographies of the Eskimo and Siouan Languages (New Publications), 478
- Playfair, Sir Lambert, information on Algeria, 166
- on the condition of Tunis since the French Protectorate, 719
- Remarks on the Commercial Future of East Africa, 731
- report on the Commerce of Algeria, 305
- Pojicha Indians, Brazil, 69
- Polar Observations, International (New Publications), 110
- Portman, M. V., A Manual of the Andamanese Languages (New Publications), 176
- The Exploration and Survey of the Little Andamans, 567 *et seq.*
- Portugal, Government Map of (New Maps), 745
- Professor de Mello on Geographical Education in, 651
- The Armed Strength of, by Lieut. Count Gleichen (New Publications), 538
- Portuguese geographical discoveries, early, 208, 209
- Posen, Wandkarte der Province (New Publications), 113
- Powell, G. H., Murder of, in Burma, 591
- Major, on forest growth on arid lands, 793
- Powles, L. D., The Land of the Pink Pearl, or Recollections of Life in the Bahamas (New Publications), 478
- Prejevalsky, General, death of, 800
- new expedition to Tibet, 378, 711
- From Kiachta to the sources of the Yellow River, exploration of the northern border of Tibet and route via Lob-nor along the Basin of the Tarim (New Publications), 738
- Pretoria and Heidelberg Goldfields, Map of the, compiled by G. A. Troye (New Maps) 114
- Prussian Geodetic Institute, Publications of the Royal, 1881-86 (New Publications), 47, 480
- Pryer, Mr., explorations in North Borneo, 140
- Pryer, Mr., report on the trade in the territory of the British North Borneo Company, 797
- Publications of the R.G.S., report of the, 462
- Pugh's Almanac and Queensland Directory, for 1888 (New Publications), 479
- Pul i Dellák, Persia, 628, *note*
- Punmah Glacier, 512
- Puttkamer, Herr v., progress of journey in Togo-land, 799
- Pyrenées Occidentales, Carte de front des (New Maps), 545
- Q.
- QUARITCH'S General Catalogue (New Publications), 54
- Quarumote or Kuamut River, North Borneo, 140
- Queensland, The Genesis of, by H. S. Russell (New Publications), 543
- Quin, J. J., on Colonisation in North Japan, 710
- R.
- RABOT, CHARLES, La Seconde Expédition Suédoise au Grönland, par A. E. Nordenskiöld, traduite par (New Publications), 542
- Rachel, L., Karte von Württemberg, Baden, und Hohenzollern (New Maps), 545
- Radde, Dr., on the Suanetian race, 331
- The Ornithological fauna of the Caucasus (New Publications), 105
- Rae, Dr., Letter from, on Hudson's Bay and Hudson's Strait as a Navigable Channel, 653
- remarks on Hudson's Bay and Hudson's Strait as a Navigable Channel, 565
- Rahang, Siam, 119, 131, 133
- Raïan and Fayoum Basins, the River of Joseph, by Cope Whitehouse, 733
- Basin, Map of the, by Cope Whitehouse (New Maps), 811
- Rainfall, Influence of Forests on, Mr. Blanford's and Professor Gannett's investigations on, 40, 98
- — — — — Major Powell on the, 793
- West of the Mississippi, General A. W. Greely on the, 308
- Ramsay, Professor W. M., Note on the Map of Lycia-Pamphylia, 160 *et seq.*
- Sir A., on the action of glaciers, 785
- Rankin, D. J., Arab Tales translated from the Swahili Language into the Tugulu Dialect of the Mákua Language, &c. (New Publications), 740
- Rás Hafún, Sea Temperature off, 707
- Rat Island, Fernando do Noronha, 426

- Ratzel, Dr. F., *Völkerkunde* (New Publications), 608
- Raudukambar volcano, Iceland, 792
- Rauner, S. Y., on the movement of drift sands in Russia, 736
- Ravenstein, E. G., Map of the Country between Lakes Nyassa and Tanganyika, compiled by (New Maps), 747
- remarks on the Commercial Future of East Africa, 731
- remarks on the Influence of Arab Traders in West-Central Africa, 531
- and A. H. Keane, *The Universal Geography*, edited by, Vols. I.-XII. (New Publications), 319
- Rawlinson, Sir Henry, remarks on a journey across Central Asia, &c., 514
- Rawson, Sir Rawson, Synopsis of the Tariffs and Trade of the British Empire (New Publications), 319
- Reclus, Elisée, *The Earth and its Inhabitants. The Universal Geography*, edited by E. G. Ravenstein (New Publications), 319
- Red Sea and Cape Guardafui, Meteorology of the, by General Strachey, 704 *et seq.*
- Work of the Hydrographic Survey in the, 418
- Reichemberg, Lieut., exploration of Konkadugu, 379
- Rendsburg, Plan von (New Maps), 322
- Ressine, M., Exploration of the Khin-gan Mountains, 304
- Réunion, Island of, M. Blondel on the, 389
- Reykjarfjord, Iceland, 306, 307
- Rhein Pfalz, Neueste, beste und billigste Spezialkarte der bayerischen (New Maps), 674
- Rhins, M. Dutreuil de, on the geography of Eastern Tibet, 577, 583
- on the Source of the Irawadi and Salwin, 170
- Ribeiro, M. J., *A Colonisação Luso-Africana, Zona Occidental* (New Publications), 610
- Richards, Admiral Sir G. H., Obituary of Vice-Admiral T. Spratt, 242
- Richter, Dr. C. M., Ocean Currents contiguous to the Coast of California (New Publications), 51
- Dr. E., *Die Gletscher der Ostalpen* (New Publications), 803
- Ridley, Mr., exploration of Fernando de Noronha, 417
- H. N., and G. A. Ramage, expedition to the Island of Fernando do Noronha, 424
- Rimbaud, M. Arthur, New Route from Antotto (Shoa) to Harar, 39
- Rink, Herr H., on Recent Danish Exploration in Greenland, 238
- Rio Grande do Sul and São Paulo Provinces, Mr. Bennett on the Condition of Trade in, 383
- Rivers, *The Great Historical*, by Léon Metchnikoff (New Publications), 318
- Rivoyre, Denis de, *Les Français à Obock* (New Publications), 51
- Robertson, J. P., *A Political Manual of the Province of Manitoba and the North-west Territories* (New Publications), 179
- Roblet, Père D., *Carte de Madagascar* (New Maps), 746
- Survey Work in Madagascar, 649
- Rock, Miles, *Guatemala Forests* (New Publications), 604
- Rocky Mountains, rainfall of the, 284, 285
- Rocky Mountain Region, project for irrigating arid lands in the, 455
- Rolland, M. G., excursion to Ued-Rir and Tuggurt, 472
- on the geology of the Algerian Sahara, 595
- on the geology of the district of Lake Kelbia, 598
- Romanow tribe, North Borneo, 6
- Roraima, Mount, Mr. Cromer and Mr. Dressel's ascent of, 166
- Rosen, P. G., *Die Astronomisch-Geodätischen Arbeiten der Topographischen Abtheilung des Schwedischen Generalstabes* (New Publications), 808
- Rosny, Léon de, *Publications de l'École des Langues Orientales vivantes* (New Publications), 54
- Roth, Dr. Samuel, *Die Seen der Hohe Tatra* (New Publications), 106
- Rousden Observatory, Devon, Volume IV. Meteorological Observations for 1887, made under the superintendence of Cuthbert E. Peek (New Publications), 399
- Royal Society, Report of Committee of the, on the Eruption of Krakatoa (New Publications), 805
- Rowley's Map of the Colony of New South Wales (New Maps), 186
- Rubiana, New Georgia Island, 360
- Ruby Mines near Mogok, Burma, On the, by Robert Gordon, 261 *et seq.*
- Rudkhāneh i Shūr river, 627, *note*
- Rukagura river, East Africa, 95
- Russell, H. S., *The Genesis of Queensland, &c.* (New Publications), 543
- Russia, Little, by E. Delmar Morgan, 668
- Politische Schul-Wandkarten der Länder Europa's, bearbeitet von R. Kiepert (New Maps), 56
- South, W. G. Wagstaff's Report on the Coal-fields of, 305
- Russian explorations in Central Asia, 414
- Geographical Society, Caucasus Section of the, 'Proceedings' of (New Publications), 808
- Geographical Society, East Siberian Section of, 'Isvestija' of (New Publications), 48, 804
- — — — — *Memoirs of the Imperial* (New Publications), 181, 182, 183, 736, 803
- — — — — *Proceedings of the* (New Publications), 54, 180
- — — — — work, 170, 172, 247
- Lapland, Exploration of, 454

Russian naturalists' work in Asia, 596, 597
 — survey of the Caucasus, 684, 687
 — — — Turkestan, The Earthquakes of May and June, 1887, in the Verny (Vernoe) District, and their Consequences, translated by Miss M. B. Hay, 638 *et seq.*
 — — — Turkistan provinces, population of, 304
 Russisch - Afghanischen Grenzgebiete, Nach den unter Major J. H. Holdich (New Maps), 58
 Russischen Armees, Dislocationskarte der (New Maps), 400
 — — — Reiches, Die Regenverhältnisse des, by H. Wild (New Publications), 252
 — — — — — Regen-Verhältnisse des, nach H. Wild (New Maps), 257.
 Russland, General und Strassenkarte von West (New Maps), 322
 — — — — — Stumme Physikalische Wandkarte von, von Dr. R. Kiepert (New Maps), 809
 Rutopi (Utope) river, 295
 Ryder, Admiral Sir A. P., Obituary of, 423
 — — — and Bloch, Lieuts., Recent Journeys in Greenland, 238

S.

SACHSEN, Kalender und Statistisches Jahrbuch für das Königreich (New Publications), 47
 Sahara, Algerian, M. T. de Bort's journey through the, 648
 Sain Noin tribe, 497
 St. Bris, Thomas de, Discovery of the name of America (New Publications), 398
 — Joseph river, New Guinea, 33, 248
 — — — — — M. du Caillaud on the, 389
 — — — — — Michael's Mount Island, Fernando do Noronha, 426, 430
 — — — — — Martin, M. V. de, Atlas Universel de Géographie Moderne, Ancienne et du Moyen Age. Nos. XII. and XIII. (New Maps), 484
 Sakai and Samang tribes, Siam, 121
 Salvator, Ludwig, Paxos and Antipaxos im Ionischen Meere (New Publications), 47
 Salwin river, Source of the, M. D. de Rhins on the, 170
 Samone valley, Burma, 262
 Sam Sams, tribe of Siam, 121
 Samuelson, James, Bulgaria, Past and Present (New Publications), 251
 San Antonio, Rio, Brazil, 62, 78
 — — — — — Domingo, Baron H. Eggers' journey into the Highlands of, 239
 — — — — — Fernando town, South America, 100
 — — — — — José river, Brazil, 62, 69
 Sandakan, harbour of, North Borneo, 24
 Sandeman, Lieut.-Colonel, survey work in India, 650
 Sangpo river, K. P.'s exploration of the, 420

Sankuru-Stromes, Originalkarte des, und seiner Nebenflüsse (New Maps), 547
 Sans, R. M., Importancia y necesidad del Estudio de la Geografía (New Publications), 744
 Santa-Fé, Plano de la Provincia de (New Maps), 259
 São Paulo and Rio Grande do Sul Provinces, Mr. Bennett on the condition of trade in, 383
 Sari-jas, glacier groups in the upper course of the, 598
 Sarpo Lago river, Turkistan, 507
 Satow, Ernest, Remarks on Siam, 129
 Sávah, Lake and town of, 624, 625, *note*
 — — — or Mazdakán Chái river, 626, *note*
 Savo Island natives, 373
 Scientific Purposes Grant of R.G.S., report on the, 463
 Schlater, P. L., remarks on Exploration of the Solomon Islands, 376
 — — — — — Mr., remarks on the Island of Fernando do Noronha, 434
 Schenck, Dr., Geologische Skizze von Süd Afrika (New Maps), 612
 — — — — — on the geological conditions and gold-fields of the Transvaal Republic, 249
 — — — — — on the geological formation of Barberton, 442
 Schleinitz, Admiral von, excursion in German New Guinea, 33
 — — — — — exploration of the Coast of New Britain Island, 303
 Schmidt, Karl Wilhelm, Sansibar- Ein Ostafrikanisches Culturbild (New Publications), 177
 Schneefalls, Die Aequatorialgrenze des, von Dr. H. Fischer (New Publications), 607
 Schöner, Johann, A Reproduction of his Globe of 1523, &c., with notes by Henry Stevens, edited by C. H. Coote (New Publications), 319
 School Atlas, Elementary, by J. Bartholomew (New Maps), 483
 Schrader, Dr., excursions in German New Guinea, 34
 — — — — — journey up the Empress Augusta river, New Guinea, 241
 Schröter, H., The Trade of the Province of Kwang-Si and the City of Woo-Chow-foo (New Publications), 107
 Schumacher, G., The Jaulán (New Publications), 107
 — — — — — Herr, survey in Palestine, 719
 Schwarzwaldes, Spezialkarte des, bearbeitet von J. L. Algermissen (New Maps), 322
 Schweinfurth, G., Sur la flore des anciens jardins arabes d'Egypte (New Publications), 315
 — — — — — Sur une récente exploration géologique de l'Ouadi Arabah (New Publications), 315

- Schweiz, Topographischer Atlas der (New Maps), 484
 — Wandkarte der, von J. M. Ziegler (New Maps), 322
 Sea temperature on the Continental Shelf, by H. R. Mill, 667
 Seasons, Movable (Tropic) Diagram of the, by J. W. Mason (New Maps), 809
 Seate river, Basuto Land, 522
 Sebakwe river, Matabele-land, 294
 Secasses tribe, Malay Archipelago, 596
 Sefton, R., explorations in North Borneo, 142, 143
 Segama river, gold deposits in, North Borneo, 142
 Seguy, Dr. G., Oran et l'Algérie en 1887, *Notices Historiques, Scientifiques et Économiques*, edited by (New Publications), 671
 Selous, F. C., Explorations in Mashona Land, 164
 — Further Explorations in Matabele-land, 293 *et seq.*
 Semena river, Basuto Land, 523
 Semenov glacier, the, 598
 Semirechinsk, M. Krasnoff's report on the Agriculture and Colonisation in the Province of, 235
 Sénégal, Haut, Campagne dans le, et dans le Haut Niger, by Colonel H. Frey (New Publications), 541
 — river, navigability of tributaries of, 379
 Sengu river, Basuto Land, 521, 522
 Sentinel Island, South, Little Andamans, 572
 Sete Kama, West Africa, communication from Mr. Walker on, 36
 Sévertsof, N. A., Orographical Sketch of the Pamir Mountain System, 182
 Shaksgam river, Turkistan, 507
 Shan States, Lieut. Jackson's survey work in the, 452
 — tribe, Burma, 268
 Shatt-el-hai river, 393
 Shaw, Mr., on Chinese Turkistan, 488
 Shelford, W., remarks on Hudson's Bay and Hudson's Strait as a Navigable Channel, 566
 Shirwa, Lake, 29, 30
 Shikara Glacier, Caucasus, 339, *note*, 780
 — Mount, Caucasus, 589, 689
 Shoa to Harar, M. Arthur Rimbaud's new route from, 39
 Shwey-oo-doung Peak, Burma, 264
 Siáh Kûh range, Persia, 629, *note*
 Siam, by J. M. Carthy, 117 *et seq.*
 — District of Chiengmai, Report by Mr. Archer of a Journey in the (New Publications), 539
 — population and climate of, 118, 119
 — rainfall of, 131, 132
 — Report by C. E. W. Stringer of a Journey to the Laos State of Nán (New Publications), 395
 — by Mr. Gould on the Trade of, 798
 Siam, scarcity of maps of, 129
 — Traverse of the route from Tavoy to the Boungte Pass into, by E. A. Kenyon (New Maps), 323
 Siberian, East, Branch of the Russian Geographical Society, 'Proceedings' of (New Publications), 48, 804
 Sibree, Rev. J., and Rev. R. Baron, Antananarivo Annual and Madagascar Magazine, No. XI., edited by (New Publications), 253
 Sibuco or Kuamut river, North Borneo, 140
 Sibucu river, North Borneo, 456, 457
 Sieger, Dr. Robert, Die Schwankungen der hocharmenischen Seen seit 1800 in Vergleichung mit einigen verwandten Erscheinungen (New Publications) 319
 — Gletscher- und Seespiegelschwankungen (New Publications), 399
 Sierra Leone, Correspondence respecting the Recent Expedition against the Yonnie Tribe adjacent to (C. 5358) (New Publications), 603
 — or the White Man's Grave, by G. A. L. Banbury (New Publications), 540
 Sierra Nevada Range, 285
 Sievers, Dr. W., Die Sierra Nevada de Santa Marta und die Sierra de Purijá (New Publications), 179
 — Die Cordillere von Mérida nebst Bemerkungen über das Karibische Gebirge (New Publications), 604
 Sicilia, Carta Itineraria, fisica e politica della, costrutta dal Prof. Gambino (New Maps), 674
 Simla District, India, Gazetteer of the, 1888-89 (New Publications), 669
 Simons, F. A. A., Plano del Rio Sinú, Republica del Colombia (New Maps), 259
 Sinai Peninsula and Arabian Desert, Dr. Walther on the geology of the, 394
 Sinclair, A. C., and L. R. Fyfe, The Handbook of Jamaica for 1888-89 (New Publications), 743
 Sinoia, old gold-mine at, 164, 294, 295
 Sinú, Rio, Republica del Colombia, Plano del, by F. A. A. Simons (New Maps), 259
 Sittang valley, Burma, 262
 Sivri Hissar, latitude of, 163
 Sladen, Colonel Sir E. B., remarks on the Ruby Mines near Mogok, Burma, 274
 Smith, Sir Donald A., Journey in Labrador, 191
 — S. Percy, The Kermadec Islands; their Capabilities and Extent (New Publications), 316
 — and J. Robertson, Map of the Chatham Islands, from surveys by (New Maps), 260
 Smithsonian Institution, Annual Report of the Board of Regents of the. Part II. (New Publications), 743

- Socotra, Botany of, by I. B. Balfour (New Publications), 540
- Solomon Islands, C. M. Woodford's proposed expedition to the, 302
- exploration of the, by C. M. Woodford, 351 *et seq.*
- natives and their customs, 369, 370
- 91 photographs of natives and scenery of the, taken by C. M. Woodford (New Maps), 404
- Songkla or Singora, Siam, 121
- Sosa, Captain Sandalis, and Dr. De Bourgade's journey through Paraguay, 167
- Souanétie Libre, La, by Raphael Bernoville (New Publications), 320
- Soyaux, Hermann, Deutsche Arbeit in Afrika (New Publications), 177
- Soyka, Dr. Isidor, Die Schwankungen des Grundwassers mit besonderer Berücksichtigung der Mitteleuropäischen Verhältnisse (New Publications), 319
- Spanish geographical discoveries, early, 208, 209
- Sparta, latitude of, 162
- Spratt, Vice-Admiral T. A. B., Obituary of, 242
- Ssu-ch'uan, the trade of, 381
- Stallibrass, E., On Deep-sea Soundings in connection with Submarine Telegraphy (New Publications), 399
- Stanford's Map of the Transvaal Gold Fields, &c. (New Maps), 402
- Stanley, H. M., progress of expedition of, 646
- expedition of, Dr. Junker's remarks on, 391, 588
- General Strachey's remarks on, 411
- Sir Francis de Winton's remarks on, 537
- Sir Francis de Winton's remarks on the probable position of, 732
- Statesman's Year-Book for 1888, edited by J. Scott Keltie (New Publications), 320
- Steains, W. J., An Exploration of the Rio Dôce and its Northern Tributaries, Brazil, 61 *et seq.*
- Stebnitzky, General, observations on local attraction, 172
- Steinen, Dr. Karl von den, progress of expedition to the Xingu river, 309
- second journey to the country of the Upper Xingu, and observations on the Primitive Indian Tribes, 593
- Steingrimsfjord, Iceland, 306
- Stephen, L., Dictionary of National Biography, vol. xv. (New Publications), 609
- Stevens, Henry, A Reproduction of Johann Schöner's Globe of 1523, &c., with Translations and Notes by, edited by C. H. Coote (New Publications), 319
- Stevenson, James, The Arab in Central Africa (New Publications), 603
- Stevenson, James, The Arabs in Central Africa and at Lake Nyassa (New Publications), 740
- Stewart, General Sir Donald, expedition to Andaman Islands, 568
- Stieler's Hand-Atlas, Neue Lieferungs-Ausgabe von (New Maps), 403, 748
- Stone, Olivia M., Teneriffe and its Six Satellites, or the Canary Islands Past and Present (New Publications), 51
- Storm, Dr. Gustav, Studier over Vinlands-reiserne (New Publications), 315
- Stornoway and London, comparison of degrees of heat and light between, 410
- Strachan, Captain J., Explorations and Adventures in New Guinea (New Publications), 605
- Strachey, General, Annual Address on the Progress of Geography, 1887-8, 405 *et seq.*
- Lectures on Geography delivered before the University of Cambridge, by
- Lecture I., 146
- " II., 205
- " III., 220
- " IV., 275
- Lectures on Geography (New Publications), 609
- Meteorology of the Red Sea and Cape Guardafui, 704 *et seq.*
- remarks on explorations in British North Borneo, 21, 24
- remarks on Exploration of the Solomon Islands, 376
- remarks on the Influence of Arab Traders in West-Central Africa, 531
- remarks on the Island of Fernando do Noronha, 435
- remarks on A Journey across Central Asia, &c., 518
- remarks on A Journey in the Interior of Labrador, 205
- remarks on A Journey round Chinese Turkistan and along the Northern Frontier of Tibet, 41, 43
- remarks on the Niger Delta, 763
- remarks on opening Session 1888-89, 800
- remarks on the Presentation of Prizes to Students of Training Colleges, 470
- remarks on Presenting Medal to Lieut. Wissmann, 467, 537
- remarks on Presenting Medal to Mr. Markham, 466
- remarks on the Ruby Mines near Mogok, Burma, 273, 275
- remarks on Siam, 133
- remarks on the Stanley Expedition, 411, 800
- remarks on Suasnetia, 350
- Strassburg, Plan der Stadt (New Maps), 113
- Strauber, Dr. Anton, Das Studium der Geographie in und ausser der Schule (New Publications), 399

Streeter, E. W., remarks on the Ruby Mines near Mogok, Burma, 272
 Stringer, C. E. W., Report of a Journey to the Laos State of Nān, Siam, by (New Publications), 395
 Stuart, Mr., on the old workings of mines in the Transvaal, 440
 Studer, Prof. B., on the action of glaciers, 788 *and note*.
 Suanetia, by Douglas W. Freshfield, 325 *et seq.*
 — glaciers of, 339, *note*, 780 *et seq.*
 Suanetian language, 334
 — race, the, their manners and customs, 328 *et seq.*
 Subansiri river, discharge of, 582
 Sudan, French, Recent Explorations in, 378
 — unter Ägyptischer Herrschaft, by Richard Buchta (New Publications), 177
 Suess, Eduard, Das Antlitz der Erde (New Publications), 399
 Suez, Gulf of, Meteorology of the, 705, 706
 Sugut river, North Borneo, 143
 Sul, Rio Grande do, and São Paulo, Provinces of, Mr. Bennett on the condition of trade in the, 333
 Sunday or Raoul Island, 316, 317
 Sungari river, Manchuria, 486, 487
 Supan, A., Die Fortschritte der Afrika forschung, 1788-1888 (New Maps), 482
 Surrey, Hampshire, and Isle of Wight, Murray's Handbook for Travellers in (New Publications), 539
 Surtees, Captain Conyers, Mission to El-Wedj, 734
 Surukwat stream, Turkistan, 506
 Sussuhy-Grande, Rio, Brazil, 62, 76
 Svenonius, M., exploration of Swedish Lapland, 454
 Sverige, Norge, Danmark och Finland. Karta öfver (New Maps), 257, 400
 Sveriges Geologiska Undersökning (New Maps), 56
 Svoboda, Dr., Ein kurzer Besuch auf den Nicobaren geschildert von (New Publications), 738
 Swaine, Lieut., explorations on behalf of the British East African Company, 708
 Sydow - Wagner's Methodischer Schul-Atlas (New Maps), 188
 Syrt Plain, Turkistan, 501

T.

TABUKA village, Matabele-land, 294
 Tachtadschy or Allevi tribe in Lycia, 104
 Tagliabue, E., Dieci Anni a Massaua (New Publications), 741
 Tambaquary, Rio, Brazil, 76
 Tampassuk valley, North Borneo, 135
 Tanana river, Alaska, 397
 Tanner, Colonel, on the lower course of the Yaro-tsanpo, 578
 Tapajos river, Brazil, Captain Telles and Lieuts. Miranda and Villeray's Expedition to, 651

Tappenbeck and Kund, Lieuts., result of expeditions to the Cameroons, 447
 Tataubun Pass, 11
 Tätowiren, Narbenzeichnen und Körperbemalen, by Wilhelm Joest (New Publications), 255
 Tatra, Die Seen der Hohon, by Dr. Samuel Roth (New Publications), 106
 Taurus range, 85, *note*
 Tautain, Dr. Exploration of Great Beledugu and left bank of Niger, 379
 Taylor, G., A Ramble through Southern Formosa (New Publications), 540
 Tcham Keui, latitude of, 162
 Tefenni, latitude of, 161, 162
 Teleki, Count, partial ascent of Mount Kenia, 533
 Telfer, Captain, visit to the Caucasus, 333
 Telles, Captain, and Lieuts. Miranda and Villeray, Expedition to the River Tapajos, Brazil, 651
 Temple, Sir Richard, Palestine Illustrated (New Publications), 474
 Tenasserim, M. Leon Fea's journey in, 711
 Teneriffe and its Six Satellites, or the Canary Islands, Past and Present, by Olivia M. Stone (New Publications), 51
 Terminology, Geographical, Note on, by H. J. Mackinder, 732
 Terror, voyage of the, to Hudson's Bay, 556
 Tetnuld Peak, ascent and height of, 342 *et seq.*
 Thaba Insimbi, Matabele-land, 294
 Thabyetkin route to the Ruby Mines, 263
 Tharalaturfjord Glacier, Iceland, 307
 Theal, George McCall, History of South Africa (1486-1691) (New Publications), 396
 Thian Shan, glaciers and flora of the, 599, 600
 — —, Herr von Krasnof's journey in the, 598, 599
 Thomas, David, positions of rivers in Matabele-land, 295
 Thompson, W. M., Improved Systems of Chaining, or Land and Engineering Surveys (New Publications), 609
 Thomson, Joseph, Progress of Journey in Morocco, 588, 647
 Thornton, John, Elementary Physiology; an Introduction to the Study of Nature (New Publications), 255
 Thoroddsen, M., journey to the North Cape of Iceland, 306
 — Further Explorations in Iceland by, 792
 Thouar, M., explorations on the Pilcomayo, 597, 598
 Thuber Glacier, Caucasus, 339, *note*
 Thuber Pass, Caucasus Mountains, 692
 Thuillier, General Sir H., remarks on the Report of the Council, 465
 Thys, Capitaine, Au Congo et au Kassai (New Publications), 671
 Tian-Shan Mountains, 496
 Tibet and Nepal, work of the native explorer M—H in, in 1885-86, 89 *et seq.*

- Tibet, area and height of, 41
 — Exploration of the Northern Border of, from Kiachta to the sources of the Yellow River, &c., by N. M. Prejevalsky (New Publications), 738
 — General Prejevalsky's new expedition to, 378, 711
 — South-eastern, the Hydrography of, by General Walker, 577 *et seq.*
 Tierra del Fuego, *Viaje al País de Los Onas*, by Ramon Lista (New Publications), 542
 Tiflis Magnetical Observations (New Publications), 49
 Tigris and Euphrates rivers, floods of the, 393
 Timbuktu, position of, 247
 — voyage of the French gunboat *Niger* to, 164
 Tisnaf river, Turkistan, 504
 Tissot, Charles, *Exploration Scientifique de la Tunisie. Géographie Comparée de la Province Romaine d'Afrique* (New Publications), 477
 Tlakanelo's village, Basuto Land, 523
 Togogebiet, *Das Deutsche, und meine Afrikareise*, by Ernst Henrici (New Publications), 476
 Togo-land, West Africa, Dr. Henrici and Herr Grade's journey in, 309
 — *Das Gebiet der Ewe-Stämme und die Deutschen Erwerbungen im, von Dr. Hassenstein* (New Maps), 612
 — German, progress of explorations in, 799
 Toll, Baron, journey to the New Siberian Islands, 248
 Tomkins, Rev. H. G., Notes on the Geography of the Region from the Nile to the Euphrates, as known to the ancient Egyptians, 717
 Tonghoo, Burma, railway to, 262
 Tongking, Captain de Cavalier de Couverville on railways in, 246
 Tourinho, Sebastião Fernando, first explorer of the Rio Dôce, 66
 Training Colleges and Elementary Schools, Geographical Education in, letter from Messrs. Oakeley and Fitch to Sir Beauchamp Walker on, 297
 — presentation of prizes to the students of, 468
 — R.G.S.'s award of scholarships and prizes to students in, 234
 Trans-Caspian railway, Baron de Bieberstein on the progress of the, 388
 — Dr. Wiedemann's remarks on the, 174
 Trans-Ilian Alatau range, 638
 Transkaspien und seine Eisenbahn. By Dr. O. Heyfelder (New Publications), 106
 Transvaal Gold Fields, Stanford's Map of the (New Maps), 402
 — Republic, Dr. A. Schenk on the geological conditions and gold-fields of the, 249
 Transvaal, The Kaap Gold-fields of the, by Fred Jeppé, 438 *et seq.*
 Transylvania, the Land Beyond the Forest; Facts, Figures, and Fancies from, by E. Gerard (New Publications), 311
 Trautwein, Th., Register zu den Publicationen des Oesterreichischen Alpenvereins (New Publications), 48
 Travellers, Guide for. *Anleitung zu Wissenschaftlichen Beobachtungen auf Reisen in Einzel-Abhandlungen. Herausgegeben von Dr. Neumayer* (New Publications), 607
 Traversi, Dr., exploration into the Urbaragh region, East Africa, 451
 Travespines river, Labrador, 194
 Treacher, Mr., explorations in North Borneo, 143
 — remarks on a summary of explorations in North Borneo, 144
 — remarks on explorations in British North Borneo, 22
 Tripolis, latitude of, 162
 Tripolitaine, La, by Marc Fournel (New Publications), 50
 Tuma, Anton, Griechenland, Makedonien, und Sud-Albanien, oder: Die Sudliche Balkan-Halbinsel (New Publications), 175
 Tumed tribe, 497
 Tumen river, Manchuria, 487
 Tumuc Humac mountains, French Guiana, 473
 Tungara tribe, North Borneo, 9, 10
 Tunis, on the condition of, since the French Protectorate, by Sir Lambert Playfair, 719
 Tunisia, travels in, with a glossary, &c., by H. S. Ashbee, and A. Graham (New Publications), 107
 Tunisie, *Exploration Scientifique de la, Géographie Comparée de la Province Romaine d'Afrique*. By Charles Tissot (New Publications), 477
 Tunka (Eastern Sayan) mountains of, Madame Golubtzov's researches in the, 388
 Tupa Dawán Pass, 504
 Tupper, Sir Charles, remarks on Hudson's Bay and Hudson's Strait as a Navigable Channel, 564
 Turfan, Turkistan, 499
 Turkistan, inhabitants of, 498
 — population of, M. Kostenko on, 304
 Turner, Mr., note on Mr. Selous's map of Matabele-land by, 296
 Tyndall, Dr., on the action of glaciers, 780, 783
- U.
- UGUN-AGATCH, Russian Turkistan, 640
 Uku Peak, Suametia, 348
 Umon district and natives, West Africa, 756

- United States, Annual Report of the Chief Signal Officer of the Army to the Secretary of War for 1886 (New Publications), 478
- Appleton's atlas of the (New Maps), 260
- Coast and Geodetic Survey. Voyages of Discovery and Exploration on the North-west Coast of America, from 1539 to 1603 (New Publications), 742
- Geological Survey, Contributions to North American Ethnology. Vols. III. and V. (New Publications), 320
- Notes on the Topographic Maps produced by the, by G. H. Gilbert, 734
- under Mr. Powell, progress of, 712
- Hydrographic charts (New Maps), 60, 187, 260, 324, 483, 548, 676, 748
- Major Powell on the rainfall and arid lands of the, 793
- Natural resources of the, by J. H. Patton (New Publications), 253
- Photograph of a model, exhibiting the plateau of the Pacific Ocean adjacent to the coast of the, and also the orography of the Pacific Coast west of the 113th meridian (New Maps), 186
- project for irrigating arid lands in the, 455
- Universal Geography, The, edited by E. G. Ravenstein and A. H. Keane. Vols. I.-XII. (New Publications), 319
- Unkofsky, Captain, The Embassy of, to the Dzungar Khung-taidji Tsovan Raktan, 183
- Urbaragh region, East Africa, Dr. Traversi's exploration in the, 451
- Urmiah, Lake, Kurdistan, 173
- Uruguay, République Orientale de l', Carte Commerciales, &c., par F. Bianconi (New Maps), 747
- Usegha, Count Pfeil's journey through, 94
- Ushak, latitude of, 162
- Ushba Peak, Caucasus Mountains, 337, 340, 689
- Usher, A., Map of British Honduras (New Maps), 812
- Ushkul, Caucasus Mountains, 835
- Ush Turfan, Turkistan, 500
- Uslar, Baron P. K., Ethnography of the Caucasus (New Publications), 176
- Philology. Part II. The Language of the Chechens (New Publications), 796
- Ussuri country, Lieut.-Colonel T. Nadarof's survey of the Northern, 181, 182
- Utopi or Rutopi river, 295

V.

- Valdau, M., exploration of the Cameroon Mountain, 380
- Valencia, Lake, Venezuela, Herr von Hesse-Wartegg's observations on, 795
- No. XII.—Dec. 1888.]
- Vallière, Captain J., summary of recent explorations in French Soulan, 378
- Van der Chijs, J. A., *Nederlandsch-Indisch Plakaatboek* (New Publications), 252
- Van Gele, Captain, discovery of the Connection of the Mobangi with the Welle-Makua, 234
- Lieut., Exploration of the Mobangi river, 300
- Vatupusau Peak, Guadalcanar Island, 365
- Vega-Expeditionens Vetenskapliga Iakttagelser. Vols. IV. and V. By A. E. Nordenskiöld (New Publications), 52
- Venezolanischen Cordillere, Dr. W. Sievers' Original-Routenkarte der (New Maps), 186
- Vénézuëla, États-Unis de, Carte Commerciale, &c., by F. Bianconi (New Maps), 747
- Venezuela, Der See von Tacarigua und die Eisenbahn von Valencia nach Puerto Cabello, von E. von Hesse-Wartegg (New Maps), 812
- The Prospects of Gold Mining in, and a Guide to the Guayana Gold Fields, by W. G. Wears (New Publications), 398
- Venukoff, M., communication on Russian Geographical work, 170, 172
- Vera Cruz, Mr. Baker on the Trade of, 384
- Vereinigten Staaten und von Canada, Karte der Volksdichte der (New Maps), 403
- Verestchagin, Vassili, Painter, Soldier, Traveller, autobiographical sketches translated by F. K. Peters (New Publications), 55
- Verneau, Dr., explorations in the Canary Islands, 247
- Verney, Sir Harry, remarks on the President's Address, 470
- Verny (Vernoe) District, Russian Turkestan, The Earthquakes of May and June, 1887, in the, and their Consequences, translated by Miss M. B. Hay, 638 *et seq.*
- Versteeg, W. F., letter from, on the Dutch Boundary Line in North-eastern Borneo, 455, 798
- Victoria, Natural History of (New Publications), 110
- Statistical Register of the Colony of (New Publications), 479
- Victorian Year-Book for 1886-87, by H. H. Hayter (New Publications), 543
- Vincent, M., on the Island of Mohilla, 598
- Voïéko, A. J., on the meteorological observations of agricultural importance in Russia, 786
- Volckmar, F., Atlas Universal para las Escuelas primarias, secundarias y normales (New Maps), 676
- Völkerkunde, by Dr. F. Ratzel (New Publications), 608
- Volks-Atlas, A. Hartleben's (New Maps), 404
- Vou Donop, Mr., explorations in North Borneo, 141

W.

- WADE, SIR THOMAS, remarks on a Journey round Chinese Turkistan and along the Northern Frontier of Tibet, 43
- Wagstaff, W. G., Report on the Coal Fields of South Russia, 305
- Wagner, J. E., *Neueste Eisenbahn und Strassenkarte von Böhmen* (New Maps), 673
- Wales, History and Geography of, for the Young (New Publications), 473
- Walker, General J. T., proposal to call Peak K 2 Godwin-Austen, 380, 516
- remarks on a Journey across Central Asia, &c., 516
- remarks on a Journey round Chinese Turkistan and along the Northern Frontier of Tibet, 41
- The Hydrography of South-Eastern Tibet, 577 *et seq.*
- Henry, Explorations in North Borneo, 142
- Mr., communication from, on Sete Kama, West Africa, 36
- Sir Beauchamp, letter from H. E. Osakeley and J. G. Fitch on Geographical Education in Training Colleges and Elementary Schools to, 297
- Waller, Horace, On some African Entanglements (New Publications), 603
- Walther, Dr., on the geology of the Sinai Peninsula and Arabian Desert, 394
- Wamanikapou Lake, Labrador, 196
- Wa-nyanja Tribe, 28
- Wardrop, O., The Kingdom of Georgia (New Publications), 807
- Watson, Major C. M., Comparative Vocabularies of the Languages Spoken at Suakin (New Publications), 480
- Wears, W. G., The Prospects of Gold Mining in Venezuela (New Publications), 605
- The Prospects of Gold Mining in Venezuela, and a Guide to the Guayana Gold Fields (New Publications), 398
- Weber, Prof. Albrecht, India and the West in Old Days (New Publications), 110
- Wedza, Mount, Matabele-land, 295
- Welle, identity of, with the Mobangi, 412
- Welle-Makua river, Captain Van Gele's discovery of the Connection of the Mobangi with the, 294
- Wells, Mr., remarks on an Exploration of the Rio Dôce and its Northern Tributaries, 81
- West Indies and British Honduras, The Forests of the, by E. D. M. Hooper (New Publications), 742
- The English in the, or the Bow of Ulysses, by J. A. Froude (New Publications), 108
- Through the, by Mrs. Granville Layard (New Publications), 110
- Wharton, Captain W. J. L., Account of Christmas Island, Indian Ocean, 613 *et seq.*
- White, C. A., Mountain Upthrusts (New Publications), 609
- S., remarks on the Commercial Future of East Africa, 731
- Whitehouse, Cope, The River of Joseph, the Fayoum and Raian Basins, 733
- Map of the Raian Basin (New Maps), 811
- Whitney, J. D., Names and Places (New Publications), 181
- Widney, J. P., and Walter Lindley, California of the South (New Publications), 397
- Wiedemann, Dr., remarks on the Trans-Caspian Railway, 174
- Wieng Chan town, story of, 124
- Wild, H., *Die Regenverhältnisse des Russischen Reiches* (New Publications), 252
- *Regen-Verhältnisse des Russischen Reiches* (New Maps), 257
- Wilkins, W., *Australasia: A Descriptive and Pictorial Account of the Australian and New Zealand Colonies, &c.* (New Publications), 254
- Wilson, Sir C. W., Address as President of the Geographical Section of the British Association, Bath, 1888, 654 *et seq.*
- remarks on the slave trade in East Africa and Mr. Stanley's expedition, 731
- Winnipeg and Hudson's Bay Railway, 564, 566
- Winsor, Justin, Narrative and Critical History of America, Vol. VII., Part 2, edited by (New Publications), 741
- Narrative and Critical History of America. Vol. VI., The United States of America, edited by (New Publications), 253
- Winton, Sir Francis de, remarks on Mr. Stanley's, 537
- remarks on receiving Medal on behalf of Lieut. Wissmann, 467
- remarks on the Influence of Arab Traders in West Central Africa, 530
- remarks on the probable position of Mr. Stanley, 732
- The Commercial Future of Central Africa, 722 *et seq.*
- Wissmann, Lieut. H., Award of Patron's Medal to, 300
- On the Influence of Arab Traders in West Central Africa, 525 *et seq.*
- remarks on receiving Patron's Medal, 537
- Sir Francis de Winton's remarks on receiving Medal on behalf of, 467
- Witti, F., Explorations in North Borneo, 136, 137
- Witwatersrand, Johannesburg, and other Gold Fields, by Charles Cowen (New Publications), 396

- Witwatersrand Goldfelder, Karte der, von F. Jeppe (New Maps), 675
 Wodehouse, P. E., Obituary of, 424
 Wolf, Dr. L., Die Erforschung des Sankuru (New Publications), 603
 ——— progress of journey in Togo-land, 799
 ——— Julius, und Joseph Luksch, Physikalische Untersuchungen in der Adria (New Publications), 106
 Wood, C. W., Letters from Majorca (New Publications), 803
 Woodford, C. M., Exploration of the Solomon Islands, 351 *et seq.*
 ——— 91 photographs of natives and scenery of the Solomon Islands, taken by (New Maps), 404
 ——— proposed expedition to the Solomon Islands, 302
 Woodthorpe, Colonel, on the source of the Dibong river, 581
 ——— remarks on a Journey across Central Asia, &c., 516
 World, General Atlas of the, by A. C. Black (New Maps), 260
 ——— Handy Reference Atlas of the, by John Bartholomew (New Maps), 60
 ——— Linien Gleicher Wärmeanomalie des Jahres (New Maps), 55
 ——— The Pocket Gazetteer of the, a Dictionary of General Geography, edited by J. G. Bartholomew (New Publications), 607
 Woso or Wocho, Mount, Abyssinia, M. d'Abbadie on, 389
 Wrangel, Mount, Alaska, 396
 Wrontchenko's and Hamilton's latitudes of places in Lycia-Pamphylia, 162, 163
 Württemberg, Baden, and Hohenzollern, Karte von, von L. Rachel (New Maps), 545

X.

- XINGU river, progress of Dr. von den Steinen's Expedition to the, 309
 ——— Upper, Dr. Karl von den Steinen on the primitive Indian tribes in the region of the, 593

Y.

- YANGTSE Gorges, 'Through the, or Trade and Travel in Western China, by A. J. Little (New Publications), 252

- Yarkand river, 505
 Yate, Major C. E., Northern Afghanistan, or Letters from the Afghan Commission (New Publications), 474
 Yay-Boo and Yay Nea rivers, 265
 Ye-ei-gnet-thaik or Birds' Nest Islands, Commander A. Carpenter's account of, 303
 Yellow River, China, Mr. Oxenham on the overflow of the, 535
 Yellowstone National Park, Report of the Superintendent of the, to the Secretary of the Interior (New Publications), 51
 Yorkshire, Map of, Physical and Political, designed by F. D. King (New Maps), 184
 Yosemite Falls, height of, 310
 Younghusband, Lieut. F. E., A Journey across Central Asia from Manchuria and Peking to Kashmir, over the Mustagh Pass, 485 *et seq.*
 Yule, Colonel, remarks on A Journey round Chinese Turkistan and along the Northern Frontier of Tibet, 42
 ——— on the source of the Dibong river, 581

Z.

- ZAMBESI river, 648
 ——— and Victoria Falls, height of, 309, 310
 Zanner glacier, 339, *note*, 342
 ——— pass, Caucasus Mountains, 692
 Zanzibar. Ein Ostafrikanisches Cultur-bild, by Karl Wilhelm Schmidt (New Publications), 177
 ——— Further Correspondence relating to (New Publications), 540
 Zeledón, P. P., Argument on the Question of the Validity of the Treaty of Limits between Costa Rica and Nicaragua (New Publications), 110
 Ziegler, J. M., Mandkarte der Schweiz (New Maps), 322
 Zintgraff, Dr., Surveys in the Cameroons Region, 648
 Zomba, Mount, 25
 Zongo rapids, Mobangi river, 300
 Zubof, N., surveys of the Amu-daria, 181
 Zululand, Further Correspondence respecting the Affairs of, and adjacent Territories (C. 5331) (New Publications), 603

INDEX TO MAPS.

AFRICA.

- | | |
|---|---|
| Basuto Land, 548 | Mombasa to Mamboia, Rev. J. Blackburn's Route from, 93 |
| Cameroons District, showing the Bantu Borderland, 676 | Niger Delta, 812 |
| Cross River, sketch map of, 436 | Red Sea and Cape Guardafui, Meteorological Charts of the, 748 |
| Kaap Gold Fields, Transvaal, 484 | Shirwa, Lake, and Neighbourhood, 60 |
| Matabele and Mashona Land, Mr. Selous' Routes in, 324 | |

AMERICA.

- | | |
|-------------------------------------|--|
| Doce, Rio, and its Tributaries, 116 | Hudson's Bay and Hudson's Straits, 612 |
| Fernando do Noronha Island, 484 | Labrador, Peninsula of, 260 |

ASIA.

- | | |
|--|---|
| Asia, Central, illustrating Lieut. Young-husband's journey, 548 | Tibet, South-eastern, Hydrography of, four maps, 612 |
| Andaman Islands, with Little Andaman, 612 | Verny (Vernoe) District, and Isik Kul Lake, 639 |
| Burma, The Ruby Mine District of, 324 | Yarkand River and the Mustagh Range, The Country between, 548 |
| Siam and the Malay Peninsula, 188 | |
| Teheran and Kom, Country between, showing situation of Savah Lake, 676 | |

AUSTRALASIA.

- | | |
|--------------------------------------|--------------------------------------|
| Borneo, British North, 60 | Key Islands, 812 |
| Christmas Island, sketch map of, 614 | Solomon and Guadalcanar Islands, 404 |

EUROPE.

- Caucasus, Central Group of the, 404

INDEX TO ILLUSTRATIONS.

- | | |
|--|--|
| Mount Ushba, Caucasus, 340 | Mount Tetnuld, from the Western Shoulder of Gestola, 692 |
| A Spur of the Caucasus, 404 | |
| Diagrams of the Formation of Christmas Island, 623 | |

ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Fifth edition. Edited for the Council of the Royal Geographical Society, by Colonel H. H. GODWIN-AUSTEN, F.R.S., J. K. LAUGHTON, M.A., and DOUGLAS W. FRESHFIELD, M.A. Contents: Hints on Surveying and Astronomical Observations. John Coles, F.R.A.S.—Meteorology. R. Strachan, F.M.S.—Geology. W. T. Blanford, F.R.S.—Natural History. H. W. Bates, F.R.S., Colonel H. H. Godwin-Austen, Dr. Dobson, J. Ball, F.R.S., and others.—Anthropology. E. B. Tylor, D.C.L., F.R.S.—Photography. W. F. Donkin, M.A.—Medical Hints. G. E. Dobson, M.A., M.B., Surgeon-Major, Army Medical Department.—General Outfit. Colonel J. A. Grant, C.B., Edward Whymper, and others. Price, in cloth, 5s. Published by the Royal Geographical Society, 1, Savile Row, W.; and to be had of Edward Stanford, 26 and 27, Cockspur Street, Charing Cross, S.W.

Instruction for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. Surveying and Mapping, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. Geology, including practical training in the field. By Mr. W. Topley, F.R.S., of the Geological Survey. 3. Botany. By Mr. N. E. Brown, of the Herbarium, Kew. 4. Photography. By Mr. John Thomson, Author of 'Photographic Illustrations of China and its People,' and other works.

The lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2s. 6d.

Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers, Vol. II. Part 2:—Now Ready.—CONTENTS:—A Bibliography of Algeria. By Lieut.-Colonel Sir ROBERT LAMBERT PLAYFAIR, K.C.S.I., H.M. Consul-General, Algiers.

** Fellows who have not applied for the Parts as published, can have Vol. I. complete by applying at the offices of the Society, 1 Savile Row, W.

MESSRS. NELSON'S NEW BOOKS.

SPLENDID NEW ILLUSTRATED WORK

"THROUGH SAMARIA" TO GALILEE AND THE JORDAN

SCENES OF THE EARLY LIFE AND LABOURS OF OUR LORD.

By J. L. PORTER, D.D., LL.D., President of Queen's College, Belfast.

Author of "Murray's Handbook for Syria and Palestine," "Jerusalem, Bethany, and Bethlehem," &c.

WITH 125 FINE ILLUSTRATIONS.

Royal 4to, handsomely Bound in Cloth extra, gilt edges. Price 10s. 6d.

SOUVENIR OF SCOTLAND: Its Cities, Lakes, and Mountains. One Hundred and Twenty Chromo Views. Handsomely bound in cloth, gilt edges. 7s. 6d.

ENGLISH SCENERY. One Hundred and Twenty Chromo Views. Handsomely bound in cloth, gilt edges. 7s. 6d.

FOR HER SAKE. A Tale of Life in Ireland. By GORDON ROY. Crown 8vo, cloth extra. Price 5s.

IN PALACE AND FAUBOURG. A Story of the French Revolution. By C. J. G., Author of "Good Fight of Faith," "Ruth Dement," &c. Crown 8vo. 4s.

LITTLE MISS WARDLAW. By LOUISA M. GRAY, Author of "Ada and Gerty," "Dunlinton," &c. Post 8vo, cloth extra. 3s. 6d.

THE GOLDEN WOOF. A Story of Two Girls' Lives. By MRS. ISLA SITWELL. Post 8vo, cloth extra. 3s. 6d.

PINCHERTON FARM; or, The Mysterious Will. By E. A. B. D., Author of "Young Ishmael Conway," &c. Post 8vo, cloth extra. 3s. 6d.

LIONEL HARCOURT, THE ETONIAN; or, Like Other Fellows. By G. E. WYATT, Author of "Archde Digby," "Harry Bertram," &c. Post 8vo, cloth extra. 3s. 6d.

MOLLY'S HEROINE. By "FLEUR DE LYS," Author of "The Young Huguenots," "A Strange Journey," &c. Post 8vo, cloth extra. 3s. 6d.

THE ISLAND HOME; or, The Young Castaways. A Story of Adventure in the Southern Seas. New Edition. Post 8vo, cloth extra. 3s. 6d.

THE CHILDREN'S CHAMPION AND THE Victories He Won. Pictures from the Life of "The Good Earl," Lord Shaftesbury. By Miss LUCY TATLOR. Post 8vo, cloth extra. 2s.

FOLLOWING HEAVENWARD; or, The Story of Alfred Reid. By PANSY, Author of "A New Graft on the Family Tree," "Esther Reid," &c. Post 8vo, cloth extra. 2s.

OUT IN THE WORLD. By PANSY. Author of "A New Graft on the Family Tree," "A Hedge Fence," &c. Post 8vo, cloth extra. 2s.

AT THE HOLLIES. or, Staying with Auntie. By MRS. STEVENSON, Author of "When I was a Little Girl," &c. Fcap. 8vo, cloth extra. 1s. 6d.

SHAKESPEARE'S DRAMATIC WORKS.

With Explanatory Notes, Parallel Passages, Historical and Critical Illustrations, Contemporary Allusions, a Copious Glossary, Biographical Sketch, and Indexes. By W. H. DAVENPORT ADAMS. With 370 Illustrations by the late FRANK HOWARD, R.A., and Facsimile of Shakespeare's Will. Two Volumes. Crown 8vo, cloth, gilt top. 7s. per set. Also in Roxburgh style, leather back. 9s. per set.

HAROLD'S BRIDE. By A.L.O.E., Author of "Driven Into Exile," "Pictures of St. Peter in an English Home," &c. Post 8vo, cloth extra. 2s. 6d.

VILLAGE MISSIONARIES; or, To Every One His Work. By the Author of "the Copsley Annals," "Father's Coming Home," &c. New Edition. Post 8vo, cloth extra. 2s. 6d.

DULCIE AND TOTTIE; or, The Story of an OLD-FASHIONED PAIR. By EVELYN EVERETT-GREEN, Author of "Fighting the Good Fight," "Temple's Trial," &c. Post 8vo, cloth extra. 2s. 6d.

CRAG, GLACIER, AND AVALANCHE. Narratives of Daring and Disaster. By ACHILLES DUCKY, Author of "With Pack and Rifle in the Far South-West," &c. With Illustrations. Crown 8vo, cloth extra. 2s. 6d.

NELLIE O'NEIL; or, Our Summer Time. By AGNES C. MAITLAND. Post 8vo, cloth extra. 2s. 6d.

AUNT JUDITH. The Story of a Loving Life. By GRACE BRAUNMONT. Post 8vo, cloth extra. 2s. 6d.

AMONG THE TURKS. By VERNEY LOVETT CAMERON, C.B., D.G.L., Commander Royal Navy, Author of "Jack Hooper," &c. With numerous illustrations. Crown 8vo, cloth extra. 2s.

EAGLE AND DOVE. A Tale of the Franco-Prussian War. Founded on Fact. By M. E. CLAYTONS, Author of "The Story of the Beacon Fire," "Sheltering Arms," &c. Post 8vo, cloth extra. 2s.

THE ACADEMY BOYS IN CAMP. By S. F. SPEAR. Post 8vo, cloth extra. 1s. 6d.

FAVOURITE BIBLE STORIES FOR THE Young. With over Fifty illustrations. Post 8vo, fancy boards, 1s.; cloth extra, 1s. 6d.

SAVED BY LOVE. A Story of London Streets. By EMMA LIESLIE. Fcap. 8vo. 1s.

THE CHILDREN'S TREASURY OF Pictures and Stories for 1889. Beautifully illustrated. Small 4to, Pictorial boards. 1s.

NEW SERIES OF TOY BOOKS.

The Favourite Coloured Picture Books for Children.

Royal 4to. Beautifully printed in Colours, 6d. each; Mounted on Linen, Untearable, 1s. each.

BOW-WOW; or, **DOG STORIES.**

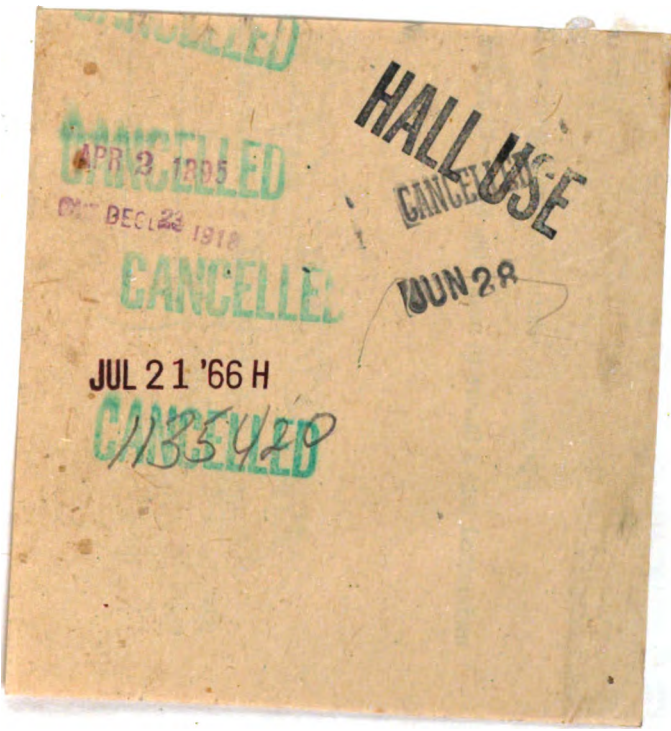
PUSSY-CAT STORIES.

MORNING AND EVENING.

SEASIDE PICTURES AND STORIES.

"T. NELSON & SONS' NEW DESCRIPTIVE CATALOGUE, containing Particulars of a Large Selection of Books for the Drawing Room, and for Home Reading, Books of Travel and Natural History, Tales for the Young, &c., &c. Suitable for Presents and for Rewards.—Post Free on Application.

THOMAS NELSON & SONS, 35 and 36, Paternoster Row, London, E.C.; Edinburgh; and New York.



CANCELLED

CANCELLED
APR 2 1895

CANCELLED
DEC 23 1918

CANCELLED

HALL USE
CANCELLED

JUN 28

JUL 21 '66 H

CANCELLED
1183428

